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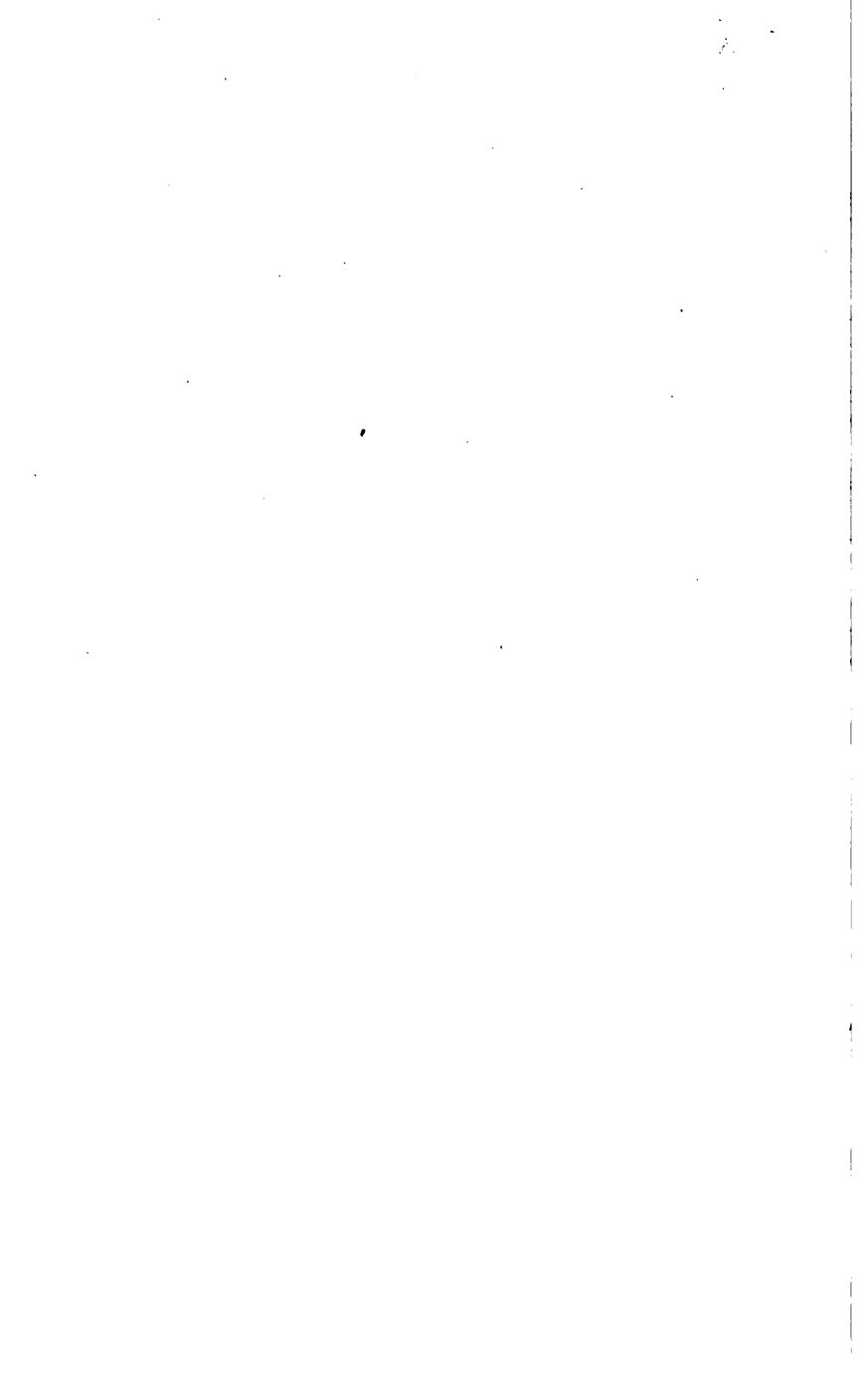
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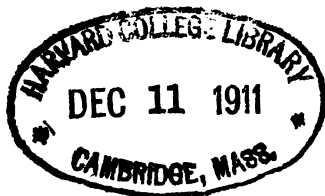
The Mechanism of Nature

BY
HENRY C. EHLERS



1911
HENRY C. EHLERS
CLEARBROOK, WASH.

Page 339.2



for notation

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PREFACE

During the years that this little book was in the making there were always hopes of the future, of some turn in the wheel that would permit of leisure for experimenting and adequate study. But there remains nothing now except to throw away the whole study or submit it with all its imperfections. All modern Science seems to rest on vibration, and all philosophy on Evolution. It seems vain and foolish to argue that these great doctrines may possibly be wrong and false. To oppose to these accepted conclusions an unproved theory of unintermittent displacement, and of indestructible form, this may seem nothing but a waste of time. Yet, when it is considered how deeply these questions enter into everything that constitutes the life of humanity, it may be well to look at these questions from every possible angle.

Certainly the theories of Gravity, of Cohesion, and Magnetism, advanced herein, cannot stand if the whole conception of Matter and Force is wrong, yet there are theories where there was no theory before. The space-filling capacity of spheres, the crowding for space necessary in a change from closest contact of two to one, into ordinary layers,

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and this crowding for space as the origin and nature of all force that human reason can perceive, is not this a new philosophy of Matter and Force?

Form, which is not outward shape alone, but identity of physical construction, from the arrangement of ultimate particles to the utmost confines of complexity. This is set forth as the real identity underlying identical Life and Force. And may not this idea of Form hold something worthy of consideration?

That this book fails in proving the momentum of bodies in motion, to consist in a connection with a universal ether movement, rather than in an addition of occult force to inert bodies, is not to be wondered at. Yet there may be something indicated that will cause some one to make a real advance in the study of momentum. And it seems as if one little invention in connection with momentum, like its conversion directly into electricity, for instance, were worth a wagon-load of books. Sticking potato balls together with pegs could scarcely succeed in determining the form of different Atoms, yet evidently this can be done, if Atoms are composed of lesser ultimate spheres. Can the great science of Darwinian biology possibly be resting on an insecure foundation? It can scarcely hurt to examine the foundation again and again before a great sky-scraper is completed.

No one understands gyroscopic persistency. No one knows how to make an etheroplane that may take hold of plane layers of ether particles, rather

PREFACE

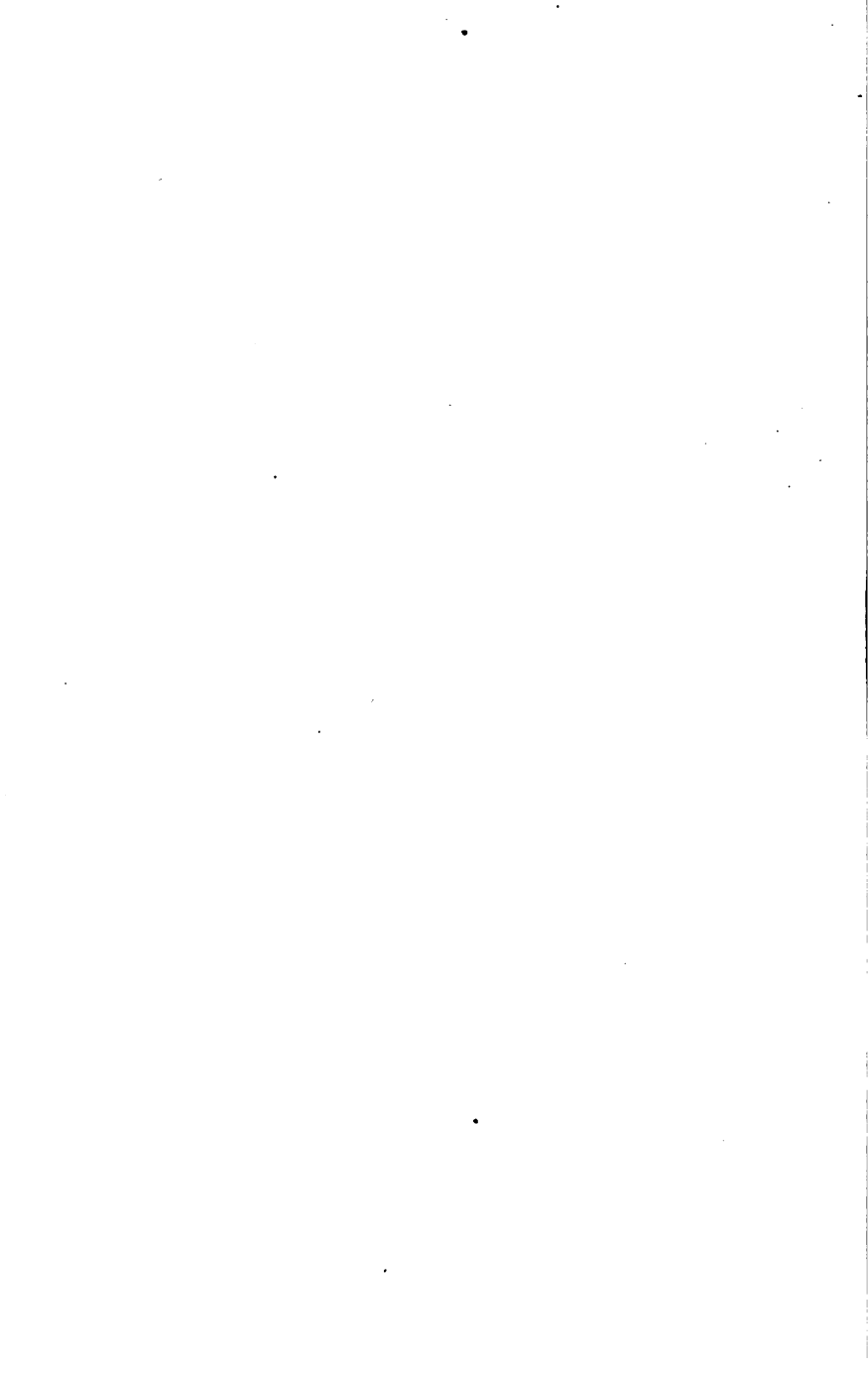
than of unstable air-currents. Blindly groping for a lead, ever bumping into insurmountable walls—yet there is a way out, and, foot by foot, the way will be found. The explorer cannot survey and level and keep exact field notes. It is folly to expect a Cook or a Peary to take hair-splitting observation, in Arctic dress, and in a life and death struggle for mere animal existence. The “Rah Rah Boys” must come after the explorer, to locate and level and primp up, and that is their business. But before the great explorer, there is the humble Esquimau, the woodsman, the voyageur, blundering ahead, making a portage or camp or perhaps only just a blaze. And yet—the woodsman’s blaze may help the great explorer when he is lost, and lead him on to an unsuspected pass.

What matters it who shall find?

What has truth to do with personality? Shall not a grain of truth be precious among a thousand bushels of trash, and who shall say: “It is not worth the winnowing”?

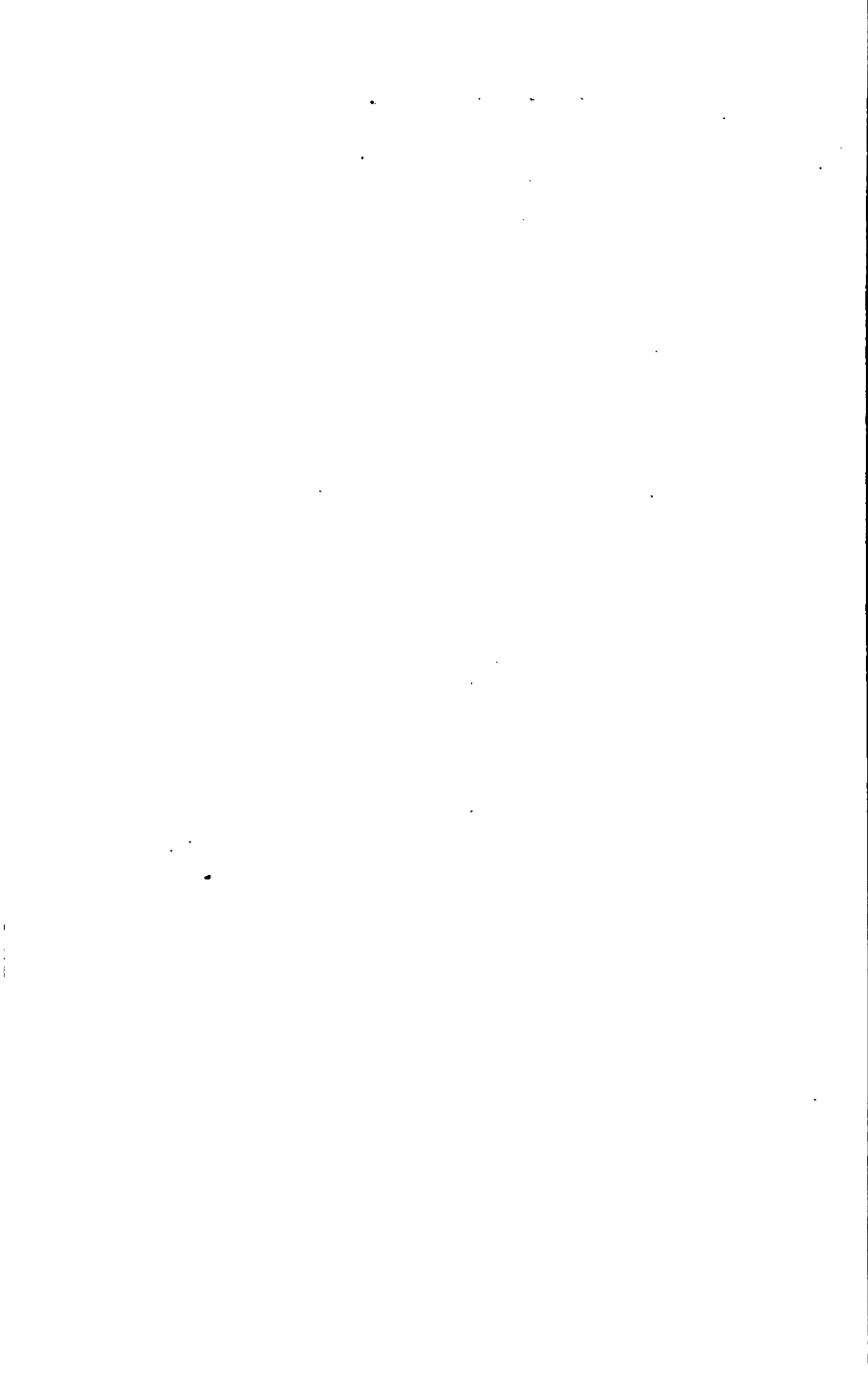
With all its faults and incoherence, this little book is submitted to you. Will you try to pick out something to elaborate and put in shape for proper use?

H. C. E.



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BOOK I

MECHANISM OF NATURE

The fruit of the world-old Labor,
The prize of the fierce long strife,
All hail to the new-born era!
To the throbbing, the pulsing Life.

Behold, all that humans imagined,
This we will begin to do;
No mortal hand shall restrain us,
Our course shall be straight and true.

The jealous Gods are impotent,
We fear not the fabled crew;
For we know the laws of the plummet
And straight are the lines we hew.

From the ruin of vanished empires,
From the ashes of countless kings,
The greatest, the last, the McSaxon,
The nation of nations springs.

One language, one flag and one Country,
The Land of the Good and Free,
Wherever my feet may wander,
And ever my heart may be.

MECHANISM OF NATURE

And woe unto them that falter,
To the cumberer in the way!
Not his blood nor his prayers may alter,
Nor the tide of our progress stay.

On the threshold of mighty ages,
In this, the triumphal hour,
Why is it the worn old pages
Tell the story of Babel's tower?

Ah, what means the old, old story,
The voices of mortar and stone?
I Am That I Am, The Eternal,
And I am, the fleeting soul.

Of the changing dust created,
Of the unknown whence and why;
To-morrow to dust returning,
Yet the glorious conscious I.

Free and high as the stars of heaven,
And each in his own true sphere,
Who shall say to the least of creation,
Thou art but a subject here.

Each blade and each star and each atom,
There is not another the same;
And each is alone in his glory,
And each is alone in his shame.

DISPLACEMENT

Only change is the life of the living,
And death is the sweet new life;
The marriage of world and of atoms,
And Peace is eternal strife.

Forever the Gods will scatter,
What fondly our hands have reared;
And ever the lost shall gather,
Where the vanquished disappeared.

And this is the Mene Tekel,
Ever written upon the wall;
This is the fate of the mighty McSaxon,
A fate that must come to all.

The mist of the rushing river
Comes again to the mountain crest,
And the weary heart must ever
Return to the father-breast.

Not grandly in blood and iron,
Not in conquest fierce and wild,
Oh, Lord, when the Kingdom cometh,
It comes to the little Child.

MECHANISM OF NATURE

AXIOMS.

- I. *Force* is known only by the changes wrought in *matter*.
- II. *Matter* is known to us only through the changes wrought by the action of *force*.
- III. One body cannot occupy the space occupied by another body.
- IV. In the same space, at the same time, and with the same material, weight is a true measure of mass.

DISPLACEMENT

DEFINITIONS OF THE SENSE IN WHICH EXPRESSIONS ARE USED.

1. *Matter* is that which fills space in the Universe.
2. *Force* is that which causes change in matter.
3. A *wave* is a passage of material from one place to another place, and a return of all the matter composing that wave to the original place.
4. *Void* is the absence of organization.
5. *Form* is the peculiar relative position of the last possible subdivisions of the material composing a body.
6. A *primary sphere* is the last possible subdivision of all material—a perfect sphere of indestructible identity—yet equal in size and in every other respect to every other primary sphere in the Universe.
7. An *atom* is composed of four or more primary spheres, which in their peculiar forms constitute a secondary identity, the last possible subdivision of elementary substances.
8. *Molecules* are the compound of two or more atoms, which, in their peculiar form, constitute the last possible division of a chemical compound.

MECHANISM OF NATURE

9. *Substance* is matter made ponderable, tangible and perceptible, by organization of the particles composing it.
10. A *primary identity* is an identity which has no particles, which has either always existed, or has been created as one whole and is incapable of undergoing a natural change.
11. A *constructed identity* is a compound of particles held together in some organization whereby it is separated in our perception from other identities.
12. An *identical manifestation of force* is an exhibition of force through similar material and producing changes in matter which appear different from other changes in matter.
13. *Occult*. That which has existence without material.

PROPOSITION I.

Matter is continuous throughout all the Universe.

Because we know that the force light comes to us from the sun, therefore, all that space between us and the sun is occupied by a continuous mass of matter. Let there be any intermission between us and the sun, where matter does not join on matter, then we would know of force otherwise than through matter, which is impossible. (Axiom I.)

DISPLACEMENT

And since we receive light from every direction, therefore matter is continuous throughout all the Universe.

· PROPOSITION II.

The void matter of the Universe consists of small primary spheres of indestructible identity.

Because a solid body may freely pass through the void (Def. 4) matter of the Universe, and because one body may not occupy the space occupied by another body.

Therefore, void matter consists of particles which can move out of the way.

Again, because the particles of void matter offer no resistance to the passage of solid bodies, these particles must move without friction. But friction is the result of inequalities in moving surfaces (every-day experience), and the perfect sphere is the only shape wherein matter has no inequality of surface (ocular demonstration). Therefore, the particles of void matter are perfectly round.

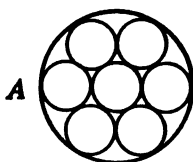
Considering the whole number of particles moving without friction, they must be equal in size, unyielding primary spheres.

Therefore, the void matter of the Universe consists of primary spheres.

MECHANISM OF NATURE

PROPOSITION III.

No space can be entirely filled by primary spheres; their closest possible contact will leave interstices between them.



Let A be a circular plane, and let the smaller circles within it represent the diameter of primary spheres.

Then, it is evident that the spheres may not be placed closer together, yet there remains in the larger circle spaces which are not filled by the circumference of the spheres. And since it is evident that any rectilineal figure would show the same result, and that this will hold true in any direction, therefore, no space can be entirely filled by primary spheres; their closest possible contact leaves interstices between them.

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PROPOSITION IV.

OCCULAR DEMONSTRATION.

The primary spheres, which constitute the void matter of the Universe, cannot all be, each to two others, in as close contact as three spheres can be to one another.

Let the bottom of a box be filled with a layer of spheres, each to two others in the closest possible contact. Then it is impossible to put on the layer of spheres another layer, which shall be in the closest possible contact, each sphere to two adjoining ones of both layers. And since the void matter of the Universe consists of many layers of spheres, therefore, the primary spheres constituting the void matter of the Universe cannot all be in as close contact as three spheres can be to one another.

PROPOSITION V.

All bodies directly perceptible to our senses are composed of particles.

Let a ball of iron be heated to 1,000 degrees Fahrenheit. Let it be measured. Let it be weighed. Let it cool to 100 degrees. Then, because it weighs no less when cooled, there has been no loss of iron. (Axiom IV.)

MECHANISM OF NATURE

But since there has been a reduction in size, something else may now fill a part of the space occupied by the ball when it was heated to 1,000 degrees.

But this is impossible if all the space was occupied by iron. (Axiom III.)

Consequently, there were within the space occupied by the iron ball spaces which were not filled by the iron. And since this may be proven with the smallest possible amount of iron, and with any known substance under greatly varying degrees of heat, therefore, all bodies directly perceptible to our senses are composed of particles.

PROPOSITION VI.

The atoms composing a solid body are not round, but they are interlocked and in actual contact one with another.

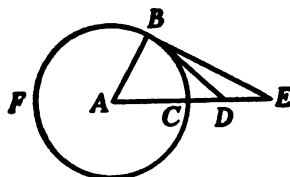
Let a bar of iron be heated. Then for every degree of heat the bar will expand a certain amount, and the expansion will be uniform through many degrees. The space between the atoms increases in size just so much for every pound of coal burnt in heating the iron. Yet if the particles were in the first place apart, the heat would have to act on them through the medium of ether.

But any force acting through the medium of ether cannot rationally be supposed to act equally

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at all distances, but, rather, it acts like gravity, after the inverse square.

Again, let the circle $B C F$ represent a disk of iron. Let A be the centre around which it is re-



volved toward $B C$. Let the dot B represent an atom of the disk. Then the force which holds the atoms together will cause the atom B to remain at the same distance from the centre, while it crosses the line $A C D E$. But the momentum acquired by the atom B will strive to make it go at right angles to the line $A B$; namely, in the direction $B E$.

Then, however strong the force of cohesion, if the atom can move at all, relative to the centre, the movement will be a compound between the circular path $B C$ and the tangent $B E$. Let that resultant path be any line $B D$; then, because the line $B D$ is between the circular line $B C$ and a line outside of the circle, the line $B D$ must be farther removed from the centre A than is the atom at B . And because every atom in the disk is subject to the same law of force and motion in a degree, according to the distance from the centre,

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therefore, every atom must move away from the centre as the disk is revolved, and the disk must become larger. But it does not become larger by being revolved ever so swiftly. Therefore, the means by which the atoms of a solid substance are held together must be of a mechanical nature. The atoms must be interlocked; they must be otherwise than round, and they must be in actual contact, one with another.

PROPOSITION VII.

Liquid substances consist of particles which are not interlocked.

Because we can readily divide any liquid substance again and again, and as readily reunite the divisions in one whole. Therefore, it is evident that the liquid substances are composed of particles.

And because a liquid substance most readily assumes the shape of any vessel containing it; therefore, it is also evident that the particles of a liquid substance are not interlocked.

Therefore, liquid substances are composed of particles which are not interlocked.

DISPLACEMENT

PROPOSITION VIII.

The particles composing a liquid substance are not in contact one with the other through any ordinary degree of heat.

Because the change from the solid to the liquid state of any substance is sudden and radical. Therefore, it is not merely a question of degree of space between the particles of the same matter in either state, for in both there is a wide range of expansion, where a solid is still a solid, and a liquid is still a liquid.

Therefore, the change consists in the alteration of the particles from being interlocked in the solid substance, to being not interlocked in the liquid state.

Again, if the particles of a liquid substance are not interlocked when first the substance assumes the liquid state, and every degree of heat drives them farther apart, because liquids expand by heat (common experience) ;

Then, the particles can only be in touch with one another in that instant when they cease to interlock.

Therefore, the particles of a liquid substance are not in actual contact one with another through any ordinary degrees of heat.

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PROPOSITION IX.

The particles composing a gaseous substance are not round, they are not interlocked, neither are they in contact one with another.

Because the particles of a gaseous substance are still the identical particles that composed the same substance in the solid and liquid state; therefore, these particles are not round. (Prop. VI.)

Because a gaseous substance readily assumes the shape of any vessel containing it; therefore, the particles composing it are not interlocked.

Because the same mass (Axiom IV) of a gaseous substance occupies more room in a vessel than it does while in the liquid state.

Therefore, the particles are farther apart in the gaseous state than in the liquid state.

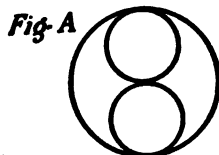
But the particles were already apart in the liquid state. Then they must be still farther apart in the gaseous state; therefore, the particles composing a gaseous substance are not round; they are not interlocked; neither are they in contact one with another.

PROPOSITION X.

A perfect sphere cannot be built up of lesser indivisible spheres; nor can a perfect cube or any other rectilineal solid be built up of indivisible spheres.

DISPLACEMENT

Let the circle A represent the circumference of a perfect sphere. And let the lesser circles within



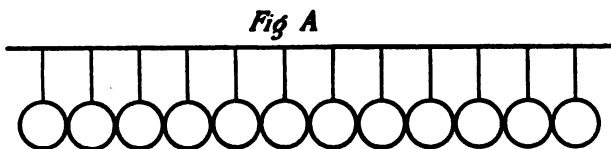
it represent the circumference of smaller indivisible spheres. Then, because the lesser spheres are indivisible, their outline cannot be altered to conform to the outline of the greater circle; and their closest possible contact with each other leaves interstices between them. (Prop. III.)

Therefore, a perfect sphere cannot be built up of lesser spheres. And since this will hold good in a greater degree with rectilineal solid bodies, therefore, etc.

PROPOSITION XI.

In the transmission of force from one body to another, every intervening body must undergo a change.

Let Figure A represent the experiment wherein



MECHANISM OF NATURE

a number of elastic glass balls are suspended, and the first one in the series is swung out of the perpendicular and allowed to strike the next one in the series.

Then, because the force acquired by the falling ball is transmitted through every ball in the series to the last ball, this will fly out of the perpendicular. But the intervening balls have remained at rest; as far as we can perceive they have suffered no change.

For any ball between the first and the last, substitute a ball of lead equal in weight. Then, because the ball of lead is not elastic, it will get dented, and the last one will not fly out. But the change made in the lead ball will not consume the force, for heat will be generated, and heat will expand the surrounding air, and change after change will take place as the natural result of the change in the lead ball.

Yet the quality which makes the glass ball different from the lead ball is not incapability of change, but rather it is that a glass ball can resume its original shape after being changed, which constitutes the property of elasticity.

Therefore, the glass balls have also undergone a change, and in the transmission of force from one body to another body, every intervening body must undergo a change.

DISPLACEMENT

PROPOSITION XII.

Force is not inherent in matter.

We know force through changes made in matter. (Axiom I.) Everywhere we see force transferred from one material body to another.

Wherever force is exhibited, we perceive it only as it changes from one body to another.

And, however far we trace a force backward, we find beyond the last change we can perceive necessity for another change.

The sun that causes all the varied earth life must necessarily himself undergo a change; for we know that he changes positions in the Universe.

Again, we can measure the action of force, and fully and accurately determine the amount of a certain material, which must undergo a given change to induce a certain change in a given amount of another material (so many pounds of alcohol burned will raise so many pounds of water, through a given number of degrees of heat).

Therefore, there is an exact equivalent between any two manifestations of force.

And, even with our imperfect appliances, we can clearly see that no action of force, or no force, as it is generally stated, can be lost out of the Universe.

But if force is inherent in matter, then if a given amount of force has departed from a material body, there must then be less remaining in

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it than there was before, or that body must have created force, and that creation of force must be continuous. (Hypothesis.)

But a constant addition of force, to the Universe, would be directly perceptible in planetary action, while on the contrary the manifestations of force are plainly repetitions, and the result of previous change.

If we deem the force, heat, inherent in coal, it is only by changing the coal that we can liberate the force, heat, and in order to change the coal we must have force to ignite it.

No material body can change itself by its own inherent force, as far as our science can observe. If there is any material body that is an exception to this, it is a fetish.

But true science has nothing to do with fetishes, but argues from cause to effect, and any body that gives off force is itself changed in the process.

Then, everywhere that we trace the action of force, we do it by the changes wrought in material; and, if anywhere, we fail to see change in a material, which exhibits force (radium giving out X rays, for instance), we must conclude that there is a change going on in the material; and if we want to know anything more about it, we must find the nature of that change. For if a material does give out of its own inherent force, then it is a thing separate from the economy of nature, and there remains nothing to be said or done or known; we must simply give it a name and note its action.

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Again, the same manifestation of force (electricity, for instance) acting upon two different kinds of matter, produces entirely different changes in them. The carbon pencil will give off light, and the electro-magnet will pull a load by the same electricity.

Therefore, it is apparent that different kinds of material have the power to exhibit the same universal force, which passes from one material to another material in their own peculiar way, but that force is not inherent in any kind of matter.*

PROPOSITION XIII.

No material substance can produce force, nor can any material substance absorb it or destroy it.

Force cannot be stored up in any material, nor in any way be augmented or decreased.

Let a gun be loaded and fired. There will be a violent change of some material close by.

The force was not inherent in the gunpowder. Neither has it been transmitted to the gunpowder on a previous occasion and stored up, for then force would have been changed into material substance, and force is not a material substance. (Def. 2.)

* NOTE.—This proposition must necessarily be a Dogma. All the reasoning this side of the Divide will not eradicate the fetish notion. The world will ever remain flat, and the sun will turn around it, and attraction will be inherent in the magnet, and the rabbit's foot will bring luck, ten thousand years after the discovery of America.

MECHANISM OF NATURE

Because we cannot readily trace the changes made by the explosion backward of the powder, is that proof that there were no changes?

Every substance has a property.

By some property we recognize each substance.

The changes wrought in matter by force are different in any two kinds of matter; the force light makes one substance green and another red.

Then is every substance a storehouse, not of force but of a capability to exhibit the action of force in its own peculiar way.

A bale of cotton may stop a bullet, but the force that sent the bullet will keep on through all time, because it is one continuous whole force; through endless changes in innumerable bodies it must go without intermission or rest.*

The friction which retards force—what is it?

The inequalities of two moving bodies engage each other, and a part of the force heats up the bodies.

Whether mysterious force or power is stored up in a wooden god, or whether a cubic inch of radium gives out light and X rays without transmitted force, or a lump of coal is held to have stored up the sunshine of bygone ages, all alike are contrary to our best conception of force.

Therefore, etc.

* This proposition has no pretence of originality whatever. But it is an important stepping stone, for in the consideration of force, particularly in momentum, the question of force storage is of utmost importance.

DISPLACEMENT

PROPOSITION XIV.

The primary spheres constituting void matter can convey force from one organized body to another organized body only by change of position.

Because the force, light, comes to us from the sun, and is made manifest to us on earth, therefore, we know that there must have been a change in matter somewhere. (Axiom I.) But primary spheres are not capable of change. (Def. 6.) Yet the force, light, to come to us from the sun must change any intervening matter. (Prop. XII.)

Therefore, the change must be in the position of the primary spheres; or at least that portion of them which are between the first one nearest the sun and the last one nearest to us on earth.

One body cannot occupy the space occupied by another body. This will apply whether a body is indivisible or not; and it is evident that through this law only can a number of bodies, which are unchangeable and unorganized, be brought into the economy of nature.

Therefore, the primary spheres of void matter can convey force between organized bodies only through change of position.

MECHANISM OF NATURE

PROPOSITION XV.

The primary spheres of void matter penetrate all substances.

Let any substance be heated. Then that substance will require more room in a vessel. (Common experience.) But it cannot occupy more room in the Universe, while it preserves its identity. (Prop. I.)

Then, something else which required room in the Universe must have changed its place in the Universe, from without the substance heated to within the substance.

But no weight has been added to the substance by the addition to its bulk. (Axiom IV.) Therefore, it was no organized substance which changed its place from without the substance heated, to within the substance; therefore, it must have been void matter.

And since any substance expands by heat, and this will apply to bodies of all sizes, therefore, the primary, etc.

PROPOSITION XVI.

Force cannot be transmitted from one body to another body by an unbroken wave.

The wave of the ocean may roll a thousand miles, but when it strikes the shore or another wave, then

DISPLACEMENT

only is its force transmitted, and at the same time the wave (Def. 3) is broken up.

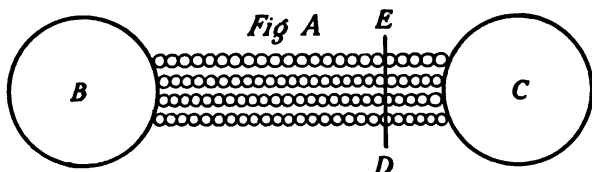
And so in every transmission of force that we can observe in mechanics, that material which conveys that force does not return unchanged whence it came.

The water that drives the mill-wheel may not be returned to the mill-pond until it returns as rain from above.

The steam that drives the engine must be condensed before it may be returned to the boiler.

Therefore, that wave which conveys force and transmits it must be broken up, in transmitting its force. But let it be otherwise, and let the wave theory of the nineteenth century be true.

And let Figure A represent two bodies B and C,



and let the dots between them represent ether particles.

Then it is evident that the mass of ether particles may not vibrate until there is some empty space provided for them to vibrate in. (Axiom III.) Therefore, let the line D E cut off a portion of the ether particles, and let the remaining major portion act as a wave to transmit force from the body B to the body C. (Hypothesis.)

MECHANISM OF NATURE

Then as soon as that wave leaves the body B that body can then no longer transmit force to it; and after it has left B, and before it strikes the body C, all the force that the wave is to transmit must be stored up in the wave.

Then when the wave strikes the body C, and transmits to the body C the force that the wave carried (hypothesis), there will be nothing to return the wave to the body B.

But let it be granted that to every transmission of force there is a resistance so strong in the receiving body, that while the body receives a portion of the force, it, also, rejects a portion large enough to return the wave unbroken whence it came. (Hypothesis.)

Then under this hypothesis (which is the wave theory) there must be innumerable vacuums in the Universe, which is absurd, and force must be stored up in material, which is untrue. (Prop. XIII.)

And last, but not least, the ether particles, which compose these waves, in light, heat and electricity, must be invested with inertia in order that the wave may rebound.*

But inertia is a property of organized, ponder-

* Clearly the interstices between Primary Spheres cannot be looked upon as vacuums. And any aggregation of P. S. cannot be conceived to possess that power which enables a brickbat to acquire momentum. That inertia is used, where momentum would be more proper, is natural when it is remembered that in the hazy popular conception of momentum it is the positive result of an entirely negative quality of matter.

DISPLACEMENT

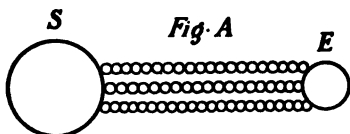
able material only, and no one would seriously think of investing ether particles, which have no weight, with inertia, which is based upon gravity and in plain relation to mass.

PROPOSITION XVII.

A force continually passing from one body to another body must be transmitted through a continuous flow of material from the transmitting body to the receiving body.

Let the circle S represent the sun. Let the circle E represent the earth, and the dots between them primary spheres.

Let a force be transmitted from S to E through the intervening primary spheres. Then the inter-



vening bodies must undergo a change. (Prop. XI.) But the only change possible in primary spheres is in their position (Prop. XIV.), and the spheres join one another. (Prop. I.)

If it be possible, let the force passing from S move the first sphere nearest to S closer to the second sphere. Then there is a vacancy between

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S and the nearest sphere, and the transmission of force is stopped, unless, from out of the body S comes forth a new sphere filling the vacancy as soon as it occurs.

Then it is evident that a continual addition of spheres from the body S will finally put every sphere between S and E in the closest possible contact.

Then, in order to change position to convey force from S to E, the sphere nearest to E must be incorporated into the body E while at the same time a sphere is disintegrated from the body S. And if the transmission of force is continuous, the flow of material must also be continuous.

Let it be otherwise, and let an aggregation of P. S. in the nature of a wave vibrate between the bodies S and E. (Hypothesis.) Then such vibrating wave must have vacant space to move in, which is impossible in a Universe that is full, everywhere matter joining on matter.

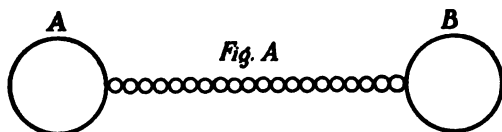
And an aggregation of P. S., void of all organization, must possess capacity for acquiring momentum, which is absurd. And the force conveyed by the vibration of the wave must be an occult force. (Definition 13). It must be stored up in the wave, which is impossible. (Prop. XIII.) It cannot be in any way limited by material, or determined in amount and intensity. No law can be applied to it that is universal in its application. Therefore, this hypothesis is wrong, and a force passing continually from one body to another must, etc.

DISPLACEMENT

PROPOSITION XVIII.

Force cannot be transmitted from one body to another body, which is in all respects equal to the first body.

Let the circle A represent a body in all respects equal to the body represented by the circle B.



And let a force be transmitted through the small bodies represented by the dots.

Then it is evident that if B is in all respects equal to A, it is, also, equal in that which tends to transmit force, from A to B, and the tendency will be equally strong to transmit force from B to A.

Let the force to be transmitted from A to B be that manifestation of force to us known as electricity.

Then, if A and B are both balls of pure copper and equal in size and form, both charged with positive electricity of the same intensity, there will be no exhibition of electrical energy until a third inequal body is brought in contact.

When the water below the mill dam gets as high as it is above the dam, there is no more power.

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And since we can see, in a thousand ways of every-day life, that all motion is the result of inequality of things around us and ever present force equalizing them, therefore, force cannot be, etc.

PROPOSITION XIX.

All substances which we directly perceive are built up of primary spheres, which we cannot directly perceive.

Because matter is continuous throughout the Universe (Prop. I), and primary spheres of void matter penetrate all substances. (Prop. XV.)

Therefore, all the primary spheres of void matter in the Universe are in contact.

Therefore, any two bodies, with the addition of a Universe full of primary spheres, constitute a solid ring, no part of which can move in relation to any other part of the ring, unless there is in the ring one part which may get longer at the same time that another part is getting shorter.

Because the primary spheres flow to us from the sun and make changes on earth which we can perceive; therefore, the primary spheres must on the earth be built up into ponderable matter. (Compare Prop. XIII, B. 3.)

Then the sun which disorganizes may transmit force to the earth, which organizes, for the two bodies are unequal. (Prop. XVIII.)

Therefore, etc.

DISPLACEMENT

PROPOSITION XX.

The primary spheres which are built up into atoms of elementary substance occupy less space in the Universe than did the same number of primary spheres in void matter.

Because the atoms of elementary substance possess an identity. (Scientific data.)

And because they are built up of primary spheres. (Prop. XIX.)

Therefore, the primary spheres must be in them placed in a fixed, unalterable system.

But the only way of uniformity possible is the closest possible contact in spheres.

And since every substance must have length and breadth and height, therefore, the primary spheres of atoms must be placed in the closest possible conjunction. (Ocular demonstration.*)

But the primary spheres of void matter cannot all be in the closest possible contact. (Prop. IV.)

Again, let a measure be filled with spheres—double B shot, for instance. Let them be poured in or placed layer by layer in any possible way. Let them be shaken and stirred. Then the measure will be full no more, for the spheres have arranged

* The ocular demonstration referred to is the laying together in closest possible contact of spheres equal in size. This becomes difficult after the spheres begin to be numerous, but affords a fascinating study, particularly when applied in attempts to ascertain the physical shapes of atoms.

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themselves into groups similar to atoms of elementary substances.

Therefore, the primary, etc.

PROPOSITION XXI.

The change of void matter into organized matter, and the necessary simultaneous change of organized matter into void matter through the resultant surplus of space in one, and the resultant want of space in the other, constitute that inequality which is necessary to bring forth changes in matter, or a display of force.

Can a cause be greater than that which was moved by it? Can anything be less than another thing, when both are inseparable parts of one whole? In the infinite circle of cause and effect, and subsequent cause which was the result of the former effect, can there be first and last or great or small? It is but the whole which is great, and the smallest part still represents that whole ring of cause joined inseparably on cause coming from the infinite and going to the infinite. "The wind blows and we hear the sound thereof, but we know not whence it cometh and whither it goeth."

The observation of the changes wrought in matter by force, and of the manner in which these changes are made, that includes the whole field of human reasoning; beyond that lies the infinite.

DISPLACEMENT

The one thing common to all material is that it must fill a certain amount of space. In every other respect there are differences by which we distinguish one material from another.

Our most abstract logic cannot invest void matter with any other qualification than that it must consist of primary spheres, which must ever occupy a certain amount of space. Therefore, the only change P. S. can undergo is a change in position relative to each other and to a positive position in universal space. The position of P. S. in atoms and of atoms in further degrees of organization determines the form of atoms and high organizations, and by a change of position in the atoms the characteristics of the atom may be greatly changed. But a substitution of one sphere or perfectly simular atom cannot produce a change except that such exchange may require space and time.

A total change of tangible material into void matter cannot happen in a Universe that is full, unless it is simultaneous with the change of an equal amount of void matter into organized matter, for this would not be the additional space required. (Prop. XX.) Whether these two changes take place in the immediate neighborhood of each other, or separated by a great distance, this question does not invalidate or transform the necessity of their simultaneousness. Again, to whatever cause a universal movement is primarily attributed, the changes in matter by force are the result of this crowding for space to occupy. And

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force itself, that does the crowding, is just as inert as matter is; in its manifestation to human perception it is nothing but a crowding for space.

Yet are matter and force both infinite in origin. But the displacements themselves, between material bodies, bring into human perception both matter and force.

BOOK II

Weist du wie viel Sternlein stehen
An dem blauen Himmelszelt?
Weist du wie viel Schaefflein gehen
Auf dem weitem gruenem Feld?
Gott der Herr hat sie gezaehlet,
Das ihm auch nicht Eines faehlet,
Von der ganzen grossen Zahl.

—*Deutsches Volkslied.*

PROPOSITION I.

Whatever thing we perceive is invested with a separate identity.

Because primary spheres are indestructible identities. (Def. 6.)

And because all substances are built up of primary spheres. (Prop XIX, B. 1.)

Therefore, no substance can possess primary identity.

And because no manifestation of force is separate and apart from the whole universal force. (Prop. XIII.)

Therefore, no manifestation of force can possess primary identity.

Yet anything must be separated from the whole, in order to impress us, and, therefore, we bestow upon everything a constructive identity; we give that identity a name, and several similar identities we designate by numbers, and the numbers become again identities, and the form of any organized substance becomes an identical form.

Then the merging of several forms must again produce an identical form, whose identity may be exhibited by entirely new attributes. Because human reason is based upon identical consciousness, it cannot conceive of anything that does not possess identity. And however vague and misty

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any human thought or conception may be, it must ultimately be based on something having identity.

PROPOSITION II.

The increase of squares is not an arbitrary enlargement, but a fixed series of the multiplication of individual squares.

Let Figure A represent a square (X) increased three times in length and breadth. Then it will

Fig. A

X	O	S
O	O	S
S	S	S

be seen that square X increased by the addition of three squares (O) is increased twice in length and breadth. And the farther addition of the five squares (S) makes the whole resultant square three times as long and three times as wide as the original square (X).

Because any square which we may use as a standard of measurement, as, for instance, a square inch, is an identical individual square. Therefore, any area, which we may measure with this stand-

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ard, must contain such a number of standard squares as is contained in the series of the increase of squares.

The following is the beginning of the series :

$1^2 = 1 = 1$ $2^2 = 4 = (1 + 3)$ $3^2 = 9 = (4 + 5)$ $4^2 = 16 = (9 + 7)$ $5^2 = 25 = (16 + 9)$ $6^2 = 36 = (25 + 11)$ $7^2 = 49 = (36 + 13)$ $8^2 = 64 = (49 + 15)$ $9^2 = 81 = (64 + 17)$ $10^2 = 100 = (81 + 19)$	<p>It is easy to see that the additional identical squares required in the increase of squares form an arithmetical progression whose common difference is two.</p> <p>When we divide a pie, we multiply the pieces of which it consists, but if it is a square pie to be</p>
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cut into square pieces the number of pieces must again fall into that fixed series of squares, or they cannot be both square and equal in area. Thus a given square area may not be divided into six equal square areas any more than a square area may be built up of six identical square areas.

Therefore, the increase of squares is not, etc.

PROPOSITION III.

The increase of cubes as designated by numbers is not arbitrary, but a fixed series.

One is an identical cube, but it takes an addition of seven identical cubes to make the next larger identical cube.

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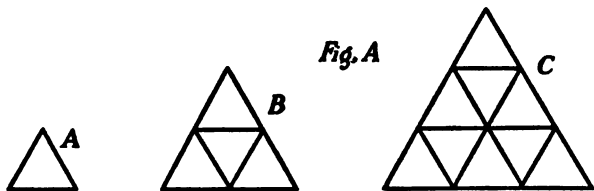
Annexed is the table of the increase of cubes :

$1 + 7 = 8$		It will be seen that the
$8 + 7 + 12 = 27$		additional identical cubes
19		required for the increase
$27 + 19 + 18 = 64$		of cubes form an arith-
37		metical progression whose
$64 + 37 + 24 = 125$		common difference is six.
61		Therefore, the increase,
$125 + 61 + 30 = 216$		etc.
etc		

PROPOSITION IV.

The increase of every plane figure is after the square, and the increase of every form is after the cube.

Let A be any triangle, then it is evident that four similar triangles in B make up a similar tri-



angle, every side of which is twice as long as the corresponding side of the first identical triangle.

The triangle C is built up of nine triangles, each one similar to the triangle A. Therefore,

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any side of the triangle C is three times as long as the corresponding side of the triangle A, and the whole area of the triangle C is nine times the area of triangle A. Circles are to one another as the squares on their diameters. (Euclid.)

The cubic contents of any solid are determined by multiplying the length and breadth by the height. This holds good of every solid in any shape.

Therefore, if two horses are similar in shape, which is identity of form, then if one is fourteen hands high and the other sixteen, the little horse

$$\begin{array}{ccc} 14 & 14 & 14 \\ \text{will displace} & - \times - & \times - \\ 16 & 16 & 16 \end{array}$$

as much water as the

larger horse.

Therefore, etc.

PROPOSITION V.

The mass of any substance is that number of primary spheres which are held together in the constitution of the substance.

Because every substance is built up of primary spheres. (Prop. XIX, B. 1.) Therefore, every substance can be compared with any other substance in common origin.

And since force is not inherent in matter (Prop. II, B. 1); and as it cannot be stored up in any substance (Prop. XIII, B. 1); therefore, when the

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same force makes a different change in different substances, it must be because of the difference in number of primary spheres which constitute the different substances, or the difference in the form necessarily assumed by the subdivisions of different substances.

Yet there remains ever that common parentage, and the last essential equality of all matter, and based on that last equality is the mass of any substance.

Therefore, since no application of any known force can change the weight of any substance, and because no addition of P. S., in their void state, to the bulk of any substance increases its weight.

Therefore, etc.

PROPOSITION VI.

The combination of four primary spheres, each to two others in the closest possible contact, constitute the first form of organized matter.

Because all material substance is built up of primary spheres. (Prop. XIX, B. 1).

Therefore, the last possible subdivision of any substance, while it still remains an identical substance, is that number of primary spheres which are held together in this new constructive identity, the atom.

And since that identity is constant through all the changes which matter undergoes in our direct

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observation, therefore, the primary spheres thus held together in the new identity of the atom must be closer together than it is possible for all the primary spheres of void matter to be. (Prop. IV, B. 1.)

Therefore, the primary spheres of atoms of organized matter are held together in the closest possible contact.

Again, every substance has height or thickness as well as length and breadth. Therefore, it is altogether unlikely that primary spheres should combine in plane layers. Then, the first distinctive form is that produced by four spheres, which in closest possible contact approach the form of a pyramid whose sides are equalateral triangles.

Therefore, etc.

PROPOSITION VII.

(Ocular Demonstration.)

Atoms of different elementary substances are not identical in form, for every addition of spheres, to any form built up of spheres, makes a new form.

Atoms of different elements have different weights. (Scientific data.) But primary spheres of void matter added to any substance, while it is increased in degree of heat, adds no weight.

Therefore, the increase of weight in the atom of one element over the weight of the atom of an-

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other element is an increase of the number of spheres held by the heavier atom in its own constitution.

But an indivisible sphere cannot conform to the outline of any other form, but its own identical form; therefore, a form assumed by four spheres cannot strictly be repeated by any other number of indivisible spheres.

But a simple laying together of spheres of any uniform diameter in closest possible contact affords the easiest and surest proof.

Therefore, etc.

PROPOSITION VIII.

The increase of form in the last subdivision of substance is an approximation and cannot be an absolute recurrence of the same form.

Because all substances are built up of primary spheres. (Prop. XIX, B. 1). And because every addition of spheres to a form built up of spheres produces a new form. (Prop. VII, B. 2). Therefore, one form cannot strictly be the enlargement of another identical form.

There may be great similarity in forms, larger and smaller—the general outline may be repeated. But there is a well defined limit, where no more spheres can be added, each to two others in the closest possible contact.

Let it be otherwise and let the form of atoms

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be strictly similar (hypothesis), then the atomic weights must fall into the strict series of the increase of cubes. But evidently such is not the case.

Therefore, etc.

PROPOSITION IX.

The primary spheres composing the molecules of elementary or chemically compound substances are in some places of contact each to two others in the closest possible contact.

Because any two substances require more room in a vessel before a chemical combination takes place than they do after it has taken place.

And because every chemical combination evolves heat.

Therefore, the atoms, or molecules composing the original substances, have come closer together than they were in each respective substance.

Again, because the smallest subdivision of the resultant compound, which we can perceive, still possesses properties different from either original substance, it is evident that a new identity has been constructed. To this new identity we give the name molecule.

An examination of the first atom (Prop. VI, B. 2) shows that this form will fit another similar form, and many others that are composed of more than five spheres. Then while every sphere, be-

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longing to the form of any atom, must be in closest contact with two others, and while even in the conjunction of two atoms, constituting a molecule, there must be points or place where the several spheres come into closest contact, yet there must be a radical difference between atoms and molecules in respect to the closest contact of their constituting spheres.

In a mere mechanical mixture these points of closest contact may be considered absent, and P. S. in their void state may intervene.

A classification of identities as primary (primary sphere), secondary (atoms), of the third degree (molecules) and subsequent higher degrees, may properly be made, as based upon the degree of intimate contact of the spheres constituting the identity. And in higher degrees of organization into visible shapes and outlines, the contact of the spheres of atoms must ever remain the closest possible contact.

Therefore, etc.

PROPOSITION X.

In the formation of new identities, by the combination of atoms and molecules, the primary spheres are not in closest possible contact, but there remain interstices between the several atoms or molecules.

Because all substances we can directly perceive expand by heat, and all substances may be con-

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tracted by the withdrawal of heat. (Common experience.) Therefore, there are in all substances spaces not occupied by that substance. (Prop. V, B. 1.) But somewhere the expansion by heat stops, and the last identical atom is not decomposed by it.

There is then a difference in the construction of an atom and the tangible, visible product of the many-fold multiplication of the atom in a substance. (Def. 9.) Therefore, the ordinary expansion of substances by heat is not an enlargement of interstices in the molecules, but of the interstices between the several molecules composing the substance heated.

PROPOSITION XI.

In the transmission of force from one body to another body, every spheral body acts as if the whole force proceeded from or was directed to the centre.

Substituting for *force* the word *gravity*, we have one of Newton's laws, which he has fully demonstrated.

But gravity necessarily makes the background for the action of any other manifestation of force.

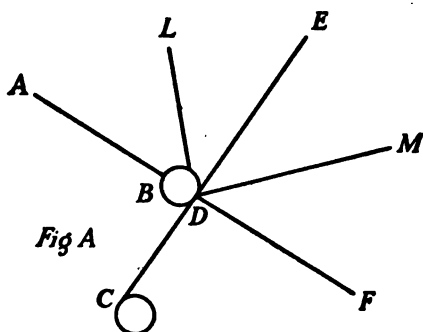
Therefore, the one universal force, acting through a similar form, must act in a similar way, if it is not altered through the intervention of other forms.

The action of spheral bodies, as observed in the

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run of billiard balls, while fully illustrating this proposition, is influenced by many imperfections of material and inaccuracy of observation. Yet enough can be readily seen to prove conclusively that the balls act as if their acquired force were situated at their centre.

Let Figure A represent the diameter of two billiard balls, B and C. And let the ball C be



projected so as to strike the ball B at the point D. Then, those particles that make up the point of contact in each respective ball are the only parts of the balls which come in actual contact; and, therefore, these particles, under the force of impact, must tend to separate in a straight line, viz., the line B. F. But they do not fly off in that direction.

Again, let each ball be considered as one whole particle, regardless of any consideration of its common centre or the point of contact.

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Then the ball C being projected against the ball B must either be repelled in the same straight line or projection or carry the ball B along with itself in a continuation of the same straight line C D E.

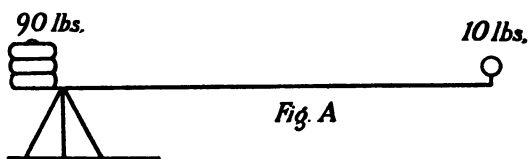
But the balls do not run together or separate in that line C D E any more than in the line B D F.

For the ball B will move off, after being struck, in the line D L, which bisects the angle B D E, and the ball C will move off in the line D M, which bisects the angle E D F. Therefore, the ball acts as if the whole acquired force were situated neither in the point of contact, nor in the whole mass of the ball, but in a point midway between; that is, the centre.

PROPOSITION XII.

In the transmission of force from one body to another body, every body, spherical or not spherical, acts as if the whole force proceeded from or was directed to the centre of gravity.

Let Figure A represent a lever resting upon a fulcrum; and let the long arm be nine times as long as the short arm.



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On the short arm let 90 lbs. weight be placed.

Then it is evident that, in order to balance the 90 lbs. on the fulcrum, 10 lbs. of weight must be placed on the end of the long arm.

But gravity acts in this case as if the whole weight were resting on the fulcrum,* which is the centre of gravity.

For either or both weights, substitute any other pressure or force, and the result remains the same.

Therefore, any other force acts in this respect as gravity does, namely, as if the whole force proceeded from or was directed to the centre of gravity.

PROPOSITION XIII.

Back of every change in material wrought by force, yet within the finite circle of human reasoning, lies the cause of all change—"life."

It is because we live that we perceive change.

All around us things die that other things may live. All growth is accomplished by building up that which has been dismembered for the use of growing.

And so intimate are life and death that they must needs be simultaneous.

There can be no plus without minus.

* Any force manifestation where a movement of particles or bodies can be perceived is ever intimately associated with gravity, and those laws of gravity that have been fully proved by Newton can be applied to many force manifestations.

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There can be no minus without plus.

There can be no life without death.

There can be no death without life.

The sun decomposes that the earth may compose.

But what is it that says to the sun, "Thou shalt decompose," and to the earth, "Thou shalt grow"?

This decree we call life.

Then is all life but a change, and all change but the result of life

PROPOSITION XIV.

Life is that power possessed by living identities which enables them to arrange the matter of the Universe into their own identical form.

To all things which have the power of voluntary motion we concede animal life.

To all things that reproduce their own form by growth we can observe, we concede plant life.

Yet every stone is made up of particles, and even stones have a family likeness; many exhibit visible signs of growth—namely, crystals—and the very fact of particle united with particle in ordered systematic way argues growth, and growth is the visible sign of life.

Because we can see no increase of volume in the stone, we hold it to be dead. At least it is dead now. Yet our apple tree does not increase in size during the winter season, and our ox may decrease in bulk and weight, yet both ox and tree are alive.

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Our science can resolve our ox and tree into the elements that compose each; and each has elements that the other also possesses.

And each has built up these same elements into a very different form.

Because ox and tree grow up before our eyes, which perceive the organs of their growth, we know they are alive. But we cannot see organs of assimilation and growth in a stone, neither can we perceive any increase or decrease of volume.

Ox and tree are continually wasting away and continually building up, and when they cease to build up they are dead, even so the stone.

Ox and tree have been alive and built up into their form—so has the stone—and ox and tree shall again dissolve into the elements that composed them—so shall the stone.

The ox shall dissolve more rapidly than the tree, and the tree shall dissolve more rapidly than the stone.

Then has life built up each and death shall resolve each.

PROPOSITION XV.

Every transmission of force from one body to another body requires time; all growth requires time, and universal life and death require time.

Because we can perceive no manifestation of force which is really instantaneous, we have long

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ago concluded with the preacher, "There is a *time* for all things."

Let a snowball be thrown into boiling water; it will take time to melt the snowball.

The electric spark takes time to cross the Atlantic.

Even light takes time to come from the stars to us.

But one arm of our weighing scale goes up just as the other goes down.

When we strike the drill with our hammer on one end, at the same instant it strikes the rock with the other end.

Yet the drill is not one whole, but the particles composing it may rebound that blow onto our nose, and we may note an instant between the given blow and the recoil.

But the weighing beam acts as one whole. And a string of primary spheres in one straight line touching one another must act as one whole body, if a force act upon them in that same straight line.

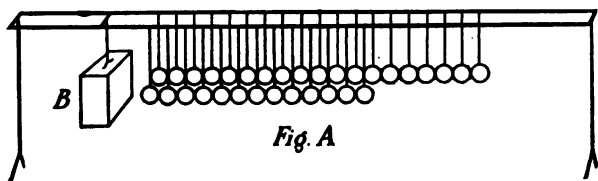
But in many cases, we think that force is transmitted instantaneously, when it really is not, and cannot be when it acts through particles capable of change in position without changing the position of all the particles of the body or bodies.

Let Figure A represent two series of suspended elastic balls, and let B represent an elastic plate hung so it will strike both series of balls at once. Then if no time were required for the transmission

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of force, the last ball of each series would fly out at identically the same time.

But they do not, and the experiment carefully



conducted will show that there is an appreciable difference.

It is then impossible to convey force through any space occupied by particles without consuming time, unless these particles are both incapable of change in themselves or in their relative position to each other, because the force must act upon one particle after another.

Again, growth is the addition of one part to another part, and the part that is added to this component must necessarily be added later.

But life and death are deemed instantaneous. Because that change from the organizing to the disorganizing must begin at same instant.

But in a thing alive, we may see utter decay on one end and vigorous life on the other. Can any one tell when our most instant death takes place? We cannot tell where death commences in our apple tree. There is no part of our ox we can destroy and say this instant he is dead. When does the dead egg become a living chicken? But

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between this egg and the chicken there lies time, and all science may not hatch an egg instantaneously.

PROPOSITION XVI.

Every identity endowed with life is also endowed with power to bestow that life upon a simular new identity.

All life is the changing of broken up identity into new identity. (Prop. XIV, B. 2.)

Clearly we see all around us the life of plants and animals, sustained by the death of other plants and animals. But the sun also dies that the earth may live. (Prop. XVII, B. 1.)

In this Universe, every primary sphere is in contact with two other primary spheres. (Prop. I, B. 1.)

Therefore, every primary sphere is in direct communication with the whole Universe.

And every manifestation of force in an identical body is the result of universal force; that is, a movement that affects every primary sphere in the Universe.

There is therefore no rest. There must be either growth or decay; there must be either living or dying in all those identities that for a season hold together a definite number of primary spheres in a definite identical form.

Again, we clearly see that plants and animals bring forth their own kind, and we know that con-

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tinuous plant and animal life depends on continual reproduction.

But we cannot directly perceive organized matter disorganizing into void matter, or any organized matter coming into existence from void matter.

If the earth organizes the void matter coming to it from the sun, where is that newly organized matter?

The earth does not grow perceptibly in circumference nor density, for an increase in mass must make a change in its orbit.

Hypothesis and theories may be useful as a basis for investigation, yet a known truth can only be a real stepping stone to truth.

Are comets new born worlds? Are meteors fragments of dead worlds? Our answers are as yet little more than theory. And yet comets and meteors testify of life and death.

All force is universal force, and all matter is universal matter.

Therefore, if organized bodies in plant life and animal life give life to similar bodies, that power must be possessed also by organized bodies which have not the same kind or degree or measure of life as plants and animals have; and atoms of hydrogen must at some time have power to organize other atoms of hydrogen.

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PROPOSITION XVII.

The production of new atoms of elementary substances from void matter is a necessity, and the primary spheres composing the new born atom must needs form into that new identity and no other.

Because all atoms are made up of primary spheres. (Prop. XIX, B. 1.) And because similar atoms contain the same number of primary spheres.

Therefore, the production of a new atom consists in bringing together, and in holding together with the same power that holds the parent atom together, just so many primary spheres in just such a form.

And it is evident that the accidental coming together in closest contact of four primary spheres will not produce the first form of organized matter; otherwise, all matter would have long ago been organized into that form.

The most exact reproduction that our art is able to make of any form is to use that form to make a mould, and to fill up that mould to reproduce the form.

Circles of like diameter, drawn on a plane in closest contact, will show that one circle is surrounded by six others. And these seven are again surrounded by six figures of seven circles each. In like manner, if three circles are considered as a triangle, it is surrounded by six similar triangles.

And with circles, triangles, or any other figure,

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produced by circles in closest contact, this is extended in an infinite series, the conjunction of seven ever producing an enlarged figure similar to the original.

Evidently atoms are not P. S. held in one plane layer, but are in closest contact in three dimensions.

Then twelve identical forms, built up of spheres, equidistant from a common centre, will produce at their centre, by their conjunction, a mould that will reproduce the identical form whenever it is filled with spheres of equal diameter.*

PROPOSITION XVIII.

All growth is the birth of new identities, and many living identities must dissolve into primary spheres before they can be taken up into a new living identity.

All food must be digested before the animal can assimilate it.

All plant food has to be changed before the plant can make use of it in growing.

Bones will not directly make bones, neither will

* The hypothesis that twelve atoms or molecules equidistant from a common centre shall produce a mould, wherein a similar atom must be formed, seems untenable. But since the whole book can be looked upon as properly a study only, therefore "What I have written I have written."

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the purest food go directly from the stomach into the blood.

If we trace the blood of animals to the last source, we find some organ which takes the digested food on one side and delivers the manufactured blood on the other. There is, then, in that organ some mysterious process going on which makes the final change from the old identity into the new.

The broken up food that comes to one side of that organ is not blood; the blood that comes forth on the other side is not broken up food, but vital blood. Then, how far goes on one side disorganization, and where starts on the other side the building up process?

The organ does not permit the passage of solid bodies of perceptible size; no ordinary liquid substance will penetrate it as a whole substance.

The balanced ration feeder says the cow must have clover hay to make muscle; the cow will pick out timothy every time, and out of the hydrocarbon manage to make muscle enough to throw the clover-fed cow over the fence.

Humans have managed for years to live on air and water and hydrocarbons, and no chemist would be able to find in air, food and water one-tenth sufficient quantity of some of the elements that these humans have built up into their system from these things.

The maple tree has formed much potassium into its body; the fir tree very little; but the soil under the maple, after furnishing that which made the

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potassium, is far richer in potassium than is the soil under the fir tree which has furnished so little. Have maple and fir received their potassium from the air? Evidently not.

Again, the brain receives impressions through the nerves, and these impressions are built up into something tangible which may afterward, at any time, reproduce the impression. But the brain that receives impressions and the brain that remembers impressions is the same material brain, and the changes in it are material changes.

The brain gets tired and needs time to rest; then it must be built up of particles which need time to organize and disorganize.

But it is evident that atoms of elements do not pass through our eyes into the brain to make physical alterations there.

Yet undoubtedly the sunlight does make material alterations in our brain; then it must be void matter which passes through eye and nerve into the brain.

Again, the brain transmits force to the hands; that force which makes the muscles of the hand perform the will of the brain. But every transmission of force from one body to another is through a flow of material. (Prop. XVII, B. 1.) Yet organized matter cannot flow through the nerves; then it must be void matter which is disorganized in the brain and organized again in the hand to pull that valve which sets the muscles to work.

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There is then in the changes going on in the stomach, nerve, brain and muscle, and wherever a new living identity is formed a total breaking up of old identities.

PROPOSITION XIX.

Heat is necessary in the reproduction of every living identity.

Because we know no substance which could not be made colder; therefore, we can observe very little about things at absolute zero.

But we know grass cannot grow at zero, neither can a chicken be hatched from an egg in a freezing mixture.

Wherever we see the process of growth, and growth is reproduction and birth, we see these processes taking place in a suitable temperature. And when that suitable temperature is lacking, one form of life after another disappears.

It is then apparent from world-wide experience that life, which is constantly depending on the destruction of old identity and the building up of new identities, is possible only at certain temperatures. And every form of life has its own range of temperature wherein only it may exist, and that range is very limited. What, then, is the reason for this well known fact?

Let it be granted that the hypothesis of Prop. XVII, B. 2, is correct. Then in order that twelve

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parent identities may arrange themselves around one common centre, the centre of force of every one equidistant from the common centre, it is evident that these parent identities must not be interlocked. Therefore, these parent identities must not be in a solid state. (Prop. VI, B. 1.) Neither must the temperature be high enough to force the parent identities far apart, for then twelve parent identities would not form the necessary mould wherein the new identity must needs form. Therefore, heat is necessary in the reproduction of every living identity.

PROPOSITION XX.

All living identities have the power of changing their centre of force.

The grain we sow does not turn into the grain we reap. The old identity must be destroyed, and in the process heat is necessary. And because time is necessary, therefore, the grain is made of particles which decompose one by one, and the new plant which will in time reproduce the old grain is built up one particle at a time.

But the centre of force of that grain of wheat we sow does not long remain the centre of force of the growing wheat plant. After the roots are fully formed the wheat plant keeps on growing.

There is, then, in growing and consequently in the birth of new identities an element of distance,

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a change of space occupied, and, therefore, a shifting of the common centre.

It may seem that animals retain their centre of force, yet a closer investigation proves that even animals do not grow equally in all directions.

But neither wheat stalk nor animal grows by the addition of solid particles on the outside of the solid particles already in place.

Everything we see growing has on the outside an envelope of more or less solid material. And somewhere within that solid envelope there are tubes for carrying liquid substance, which in some organ of the living identity are transformed into identical substance.

The nails on the fingers do not grow on that end we continually cut off, but they are pushed out from the quick. So it seems to be with all growth. But how is this done?

Again, let it be granted that Prop. XVII, B. 2, is correct. And let it be remembered that throughout all the Universe matter is continuous. (Prop. I, B. 1.)

And the shifting of primary spheres of void matter requires no force.

But void matter organized into material substance occupies less room in the Universe than it did before, and, therefore, the tremendous force displayed in growth is not the result of new identities organizing, but of the old identities disorganizing, and thereby requiring more room.

For everywhere the birth of a new identity is

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the necessary result of the death of an old identity, and everywhere the material of the dying identity by occupying more room pushes out the limits of the new identity.

And the twelve parent identities that have within them formed a new identity constitute now (the thirteen together) one of twelve larger identities which shall in turn give birth to a new larger identity.

Does this apply only to atoms and molecules? Evidently not.

For in ever widening circles the processes of growth are repeated, and the most complex identity, the living human body, grows as other identities grow, and these identical hands are the products of those atoms that organized from the primary spheres of void matter.

Because this grain of wheat will grow into a wheat stalk and the wheat stalk will reproduce the grain of wheat, therefore, within this grain of wheat lies that capability of organizing the new wheat stalk and the new grain of wheat.

And because no force is inherent in matter (Prop. XII, B. 1), therefore, the grain of wheat we sow can only mould through the agency of universal force the universal matter into its own form. And there must be within that grain of wheat a material organization of particles, such that both new wheat stalk and head and new grain must needs be moulded from those old identities that shall perish to build up the new.

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And the power of changing the centre of force must lie in that grain we sow when nature shall supply that which is needed for the new growth.

PROPOSITION XXI.

Every living identity has the power to appropriate universal material in proportion to the mass constituting the living identity.

“Unto him that hath shall be given.” All the world testifies to the truth of this.

And if our hearts rebel against it, yet victory is to the strong and the garlands of the conqueror are woven with the heart-strings of the vanquished.

The vigorous plant shall withstand the drought; the weaker ones that perish under it shall feed the overtopping.

From the feeble plant shall be taken the little it has, for the hot winds shall dry it and the parasite shall sap the feeble life.

And this is growth, for the plus of life necessitates the minus of death, and plus and minus shall be to us a stumbling block forever in the algebra of creation.

Not as a moral law, but as a mechanical necessity, all things grow from things that are destroyed.

And because every living identity is not a primary identity, but an identity built up of many primary spheres, therefore, that life which was

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bestowed on the young, small plant or animal must be extended to every primary sphere added in growth.

Then is life a primary identity? Surely not. For a primary identity cannot grow and extend; it can only unite with other identities. (Demonstration, Prop. XVII, B. 2.) Life and death require time. (Prop. XV, B. 2.) Life and death must be confined to space and distance. (Prop. XX, B. 2.) Life and death are proportionate to the mass of the dying and of the living identities.

Then, life is but a manifestation of the one whole universal force, which shall form a cedar tree in the mould supplied by one seed, and forms the cabbage in the mould supplied by another seed. Is that cedar tree contained in that seed? No. For the seed weighed less than one grain, and the tree weighs more than a ton. Was the life of that cedar tree contained in that seed? No. For the tree has produced a million seeds, each one of which had just as much life as the parent seed.

The tiny seed was directly in contact with few other living identities, and with few primary spheres of void matter, the tree has broadened out that contact a millionfold.

Then, shall the great tree lay hold, with unnumbered subordinate identities in its own proper identity, on that which builds up its mass and its life? But that also which causes death and dismemberment shall lay hold on him at innumerable points.

“Unto him that hath shall be given,” and that

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which is given him shall come into his life, and unto death.

PROPOSITION XXII.

In the reproduction of living identities by the co-operation of two sexes, each sex contributes a part to form that mould, wherein the new identity must needs be formed by universal force of universal matter.

All animals are either male or female, and their offspring are the product of both.

In many plants we can clearly observe two sexes. Yet female and male are similar identities.

“Bone of my bone and flesh of my flesh,” said Adam of Eve.

Many plants have both male and female blossoms on the same stalk and even in the same blossom.

And, then again, it seems impossible to observe sexuality in some plants, and we say that they grow from the roots or slips.

And a great many plants will grow from seeds which are the product of two sexes, and also from root or slip. And in either case the identical plant will be reproduced.

It is evident that the new identity cannot be a primary identity, because two sexes have produced it and a primary identity cannot consist of two halves.

And, because this new identity, which is the product of two sexes, will again, in the future,

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contribute its part to two new identities, of whom one shall belong to each sex; therefore, sex does not constitute a separate identity.

But let it be granted that the old hypothesis is true, namely: that that seed which produces the new identity is contained in the male and that the female only supplies that material and the environments that are necessary to grow the seed into the new identity.

And, let it be granted also, that the other hypothesis is true, namely: that identical life is a primary identity.

Then, the whole life of the future new identity is contained in that male seed, or else supplied from the outside of both male and female, and that life can, therefore, not be affected, altered, modified or diversified by the female that supplies only raw material to the growing identity. (Hypothesis.) But this is absurd; for everywhere we observe hereditary traits descend from both male and female.

And equally absurd it is to claim that the life of a cow has no reference to the life of her calf; for, in that case, there need be no similarity whatever between cow and calf, for life is that power possessed by every living identity, which enables it to arrange the matter of the Universe into its own form. (Prop. XIV, B. 2.) Again, because life is a primary identity, and contained in the male seed (Hypothesis); therefore, in the first male, there must have resided, beside his own

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proper life, the life of every one of his descendants that lives or ever shall live. (Hypothesis.)

Then, have all those lives been asleep? Is that which is to animate dead material itself capable to exist in perfect negation?

It is absurd to attribute to these ready-made lives, either the power to exist without manifestation or the capability to grow with our growth and strengthen with our strength.

Because, all life is interwoven with that material, which through that life constitutes a living identity.

Therefore, the extension of that life to a new identity from two parent identities involves the production of a mould wherein universal force must form the new identity.

And both sexes can contribute to that mould and both sexes may be equally necessary.

And the new identity must needs be similar to both parents, as far as they are similar, and that similar form must be affected by universal force, even as the parent forms were affected; therefore, the life also shall be similar.

PROPOSITION XXIII.

Every living identity is a compound of lesser identities.

Because, all substances are built up of primary spheres (Prop. XIX, B. 1); therefore, every living identity is a compound of primary identities. Be-

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cause, every living identity can be divided and every higher identity can be separated into organs that together make up the whole; therefore, that whole is not a primary identity.

The human body has many fibers and each fiber consists of many atoms, yet the human body may be dismembered and every fiber disorganized, and yet leave the identity of the atoms unimpaired.

Our teeth, which belong to our own proper identity, may be extracted, one by one, and transferred into the identities of others.

Modern surgery has substituted or transferred many parts of the human body, and brain and heart have been fixed up again, after terrible injury.

Then, it is evident that a subordinate identity within a higher identity may be destroyed without destroying the higher identity, and the higher identity may be disorganized without destroying the lesser identity within it.

And that which binds all subordinate identities together in one higher identity is the life of that higher identity, and its growth is the multiplication and the growth of lesser identities, and the reproduction of the higher identity is the bringing together of similar subordinate identities into a similar higher identity.

Then it is evident that the life of the subordinate identity is as truly life as is the life of the higher identity until the subdivision shall arrive at primary identity.

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PROPOSITION XXIV.

Identical life is the necessary result of identical form.

Any force acting upon four primary spheres in closest possible contact as one atom must needs act the same way on four other primary spheres held together in a similar atom. And this is equally true of any other atom or form composed of many atoms.

If not, let it be otherwise, and let atom or combination of atoms have power to verify a force acting upon it.

Then a substance (charcoal, for instance), under the action of a force (heat, for instance), may or may not become incandescent, or it may become magnetic or lessened in weight. (Hypothesis.)

But that is absurd, for all our knowledge is based upon the certain results that certain actions will invariably produce, and when the same cause fails to produce the same effect upon the same material, we shall be utterly lost in all the affairs of ordinary life.

So intimate are life and the material form that exhibits life, that we must go outside of all our experience and beyond our finite circle of reasoning to imagine a life without material form. An identical form cannot be a primary identity unless it is a primary sphere.

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Identical life of an identical form cannot be a primary identity, because it is reproduced and grows with the growth of the identical form.

Is there a similar life made for every similar form?

Do these lives lie around waiting for a form that fits them?

Surely not, for life must reproduce the form, and form must reproduce the life.

Therefore, identical life is the necessary result of identical form.

PROPOSITION XXV.

Everything we can directly perceive is a living identity or a compound of living identities.

There is evidently a vast difference between the sun we can directly perceive and the material which lies between us and the sun.

Because, sun and earth and planets have regular orbits, which we can compute; therefore, it is evident that universal force, both in the manifestation of imparted momentum and in restraining gravity, works entirely different on the great number of primary spheres which intervene between the heavenly bodies and themselves.

But all bodies are composed of primary spheres (Prop. XIX, B. 1), and the same force cannot make a different change in similar material if

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everything pertaining to that material is also similar. (Prop. XVIII, B. 1.)

Therefore, the difference between force, acting on void matter, and force acting on organized matter, is the result of difference between the two. And since organized matter and void matter are alike composed of primary spheres, the difference between them must consist in the organization which holds together the primary spheres constituting material substance in the fixed regularity of a peculiar, stable identical form.

And that which compels the organization is life. And that life is not inherent in matter (Prop. XI, B. 1). Neither is that life a primary identity, for the life extends and grows with the growing form, and is the necessary result of that form.

Therefore, everything which has organization, or form, is endowed with life, and when that life is withdrawn the material that composed the form must return whence it came.

Then, if the simplest form of organization, the atom, has an identical life because of its identical organization, the human body also must have an identical life because of its identical organization.

But the organization of the atom does not embrace the organization of the human body, for that is composed of innumerable atoms. And, as the organization of the human body is more complex and higher than that of the atom, so is the life of the human body higher than the life of the atom. Yet in each is life.

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PROPOSITION XXVI.

The environments of living identities are themselves the result of change in living identities, and all environments were an effect before they could become a cause.

Any life that we perceive is manifested through some identical material form, and no two forms which are not similar ever exhibit similar life, either in growth or requirements for growth.

We observe a universal force, which is one whole force, and universal matter which is one continuous mass of particles everywhere touching one another.

And, because one particle cannot occupy the space occupied by another, therefore, there is not room in the Universe for another primary sphere, unless the spaces between the primary spheres can be lessened.

But these spaces cannot be lessened save only by arranging the primary spheres into the form of atoms of elements and molecules as compound atoms. (Prop. XX, B. 1.)

Because, if in one layer of primary spheres every sphere is brought into the closest possible contact by some force, another layer adjoining it will thereby be thrown out of the closest possible contact. (Ocular Demonstration.)

And, it is therefore evident, that any accidental bringing together of primary spheres into the form

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of atoms and their multiples (in closest contact) is not possible where force or pressure is uniform on every sphere as it is on the void matter of the Universe.

There is an inequality required (Prop. XVIII, B. 1); and all universal force brought to bear on a Universe full of primary spheres cannot produce any change in their relative position.

Neither can all the universal force produce a change in a Universe filled partly with primary spheres and all the remaining part with organized forms, for, in that case, the Universe is still full.

Somewhere there must be inequality in the Universe; somewhere there must be an outside to the eternal circle of cause and effect.

The infinite beyond this circle is not an object of human reason, but within that circle everything is subject to human reasoning, and, therefore, it is possible to learn the reason for every change in material brought about by universal force.

Everywhere our science notes an exact equivalent between that which dies and that which is born.

In all the chemistry of nature, there is not one atom gained or lost, as far as we can observe. It is impossible to make one additional new atom out of primary spheres, for that necessitates the disorganization of a corresponding or similar atom; if not, there would be an empty place in the Universe, or some primary spheres that are in closest contact would be placed at right angles.

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Everywhere we see effect follow cause and the effect become the cause to another effect, until every cause is an effect and every effect is a cause.

Could the sun give light by disorganization before it was organized? Surely not, any more than a chip can burn before it is a chip.

When the Universe was void, that is, when it was filled with primary spheres that were each independent of the other, there were no environments, and no primary sphere could exert any influence on any other primary sphere, let the pressure on it be ever so great, for every influence consists of pressure on one side and yielding on the other.

All the innumerable primary spheres of the Universe move without the slightest resistance when there is pressure on one side and yielding on the other; all the force of the Universe cannot make them yield if applied equally from two opposite sides.

This is the great fruit of Newton's labor, that our science has been able to realize that in this Universe nothing can be either gained or lost, that as far as our circle of reasoning goes, both material and force are everlasting and incapable of increase or decrease.

But equally all the Universe cannot, of its own self, go beyond itself or make one change which is not the result of a former change, or produce one form without a mould to produce it in.

Let it be granted that the Universe was first created "void and without form," and that en-

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vironments were the cause of organism (or material substance).

And, let it be granted that the primary spheres were in as close contact as the whole mass could be. (Prop. I, B. 1.)

Then not one of them could be made to change position by any pressure whatever, for any pressure would be equally on all. There could be neither motion, environment, nor anything else but a Universe full of primary spheres.

But, let it be granted that the Universe was not full of primary spheres at creation, and that a pressure, acting on one primary sphere, was communicated to other primary spheres successively, producing forms accidentally.

Then the production of forms from primary spheres multiplied the empty space or spaces and thereby made more room for further interchange and organization, and the necessity of equal effect from equal cause is done away with, and ever increasing environment compels ever increasing organization.

Or, let it be granted that the Universe is eternal, then every change is caused by a former change and every new form is cast in the mould of an old form.

Or, again, let it be granted that the Mosaic conception is correct. Then the creation of void matter is a distinct act; the creation of force another distinct act; and the organization of living identities another. And the setting apart the division of

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the void from that which has form is an act of creation; and life, the crowning glory, is not the result of environment, but the cause.

PROPOSITION XXVII.

Universal life is manifested through an interchange of material, and every manifestation of force is a mechanical displacement of material parts.

Clearly life is a manifestation of universal force, derived from the infinite primary cause, and compelling organization into identical forms.

Therefore, we cannot perceive life as a principle, as one whole. But identical lives are exhibited all around us, and many of the changes in living identities we can observe.

And the knowledge of these changes constitutes science, and if there can be any changes in living identities which are not material changes, true science has nothing to do with them. (Axiom 1.)

And the ability to provoke and control changes constitutes our art, and the finding of new means to induce desired effects constitutes our invention.

Yet, in all the affairs of life, we are dependent on material, and all progress is an acquirement of greater knowledge about material changes.

Any link of the infinite chain of universal force may be perceived, because of its separate identity,

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but only in its relation with other primary identities can we perceive any primary identity, for change only we can perceive, and change is impossible in one only primary identity.

We can know life only through living identities, and these are forms.

Here is a piece of granite, and yonder goes a horse. Horse and granite alike are composed of primary spheres, and whatever life each has is the product of the same universal force exerted on primary spheres that are exactly alike in every respect.

The same force, working through the same material, yet produces the endless variations of universal life, because of an endless variety of organized forms.

Then, in that trinity of force, material and organization can either be subordinate or greater.

All the force we can know is exhibited through matter. All the matter we can know is manifested through force. Force and matter alike are brought into our perception only through material forms.

In all the endless revolutions of force and matter, not one particle of either one can be lost, nor can there be any gain; neither can all the Universe produce a new form nor lose an old one.

Change is not a limitless haphazard, for every change is the inevitable result of a former change, and if any act of ours can produce an effect, it is because we can, by a certain voluntary change in ourselves, set in motion an infinite number of

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changes, the most immediate of which we can calculate and observe.

But there is order in the Universe; because the number of material forms is a finite fixed number, and because of that, there can be no new manifestation of force.

Let it be granted that the Universe can produce a new form.

Then the Universe is able to produce an infinite number of new forms, and these new forms must produce new environments to alter every old form. (Hypothesis.)

And no natural law can be universal in application—yesterday, to-day and to-morrow—for at midnight evolution gave birth to something that upset the whole arrangement. (Hypothesis.) Seven undivided identities cannot produce a cube; neither can a square be made of equilateral triangles or circles.

Primary spheres cannot be built up in an endless variety of atoms, for there is a limit to the number that can be each to two others in closest contact.

There is a harmony of sounds as certain as the increase of squares; there is a law of colors as certain as the law of forms; because, both sound and colors are the certain, inevitable product of one whole force, through certain material forms.

Truth and beauty are not creatures of popular opinion, and all the courts may not change a fundamental law of our being.

Inseparably, force and matter and living identity

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are linked together, and any attempt to study or perceive any one without the two others is an utter failure.

Therefore, all life is manifested through an interchange of material, and every manifestation of force is a mechanical displacement of material parts.



BOOK III

And Moses said, I will now turn aside, and see this great sight, why the bush is not burnt.—Exodus, 3:3.

PROPOSITION I.

Force can act only between organized bodies of material.

To every action there is a reaction.

If we lift a hundred-pound weight, our feet press the ground with a hundred pounds additional pressure. The engine must be bolted to the floor to turn the shaft. When a boy throws a rock he kicks the earth with his feet, and this may easily be verified on a scale. The force that propelled the rock came into play between the boy and the rock; the boy had to stand on something that did not give way. And so, in every manifestation of force, we may perceive, we must needs have two identities perceptible directly to our senses. The great mass of void matter contained in the Universe cannot be the stable background from which force may act or react upon, because every primary sphere of void matter in the Universe can freely move out of its place without hindrance; and no change of position of any organized body floating in that great sea of unresisting primary spheres will make either more or less room in the Universe. Neither can the bodies, moving in unresisting primary spheres, act as a stable base for the action of force, unless

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something holds them together in a fixed relative position. Therefore, whether we consider the boy that throws the rock as one with the earth, and stop tracing the manifestation any farther in the reaction, or carry on both action and reaction infinitely, in every separate, identical manifestation of force, we must have two identities.

And this organization that constitutes identities is ever necessary for our perception of force. Where bodies are held together by the interlocking of their atoms we must have a life that holds the atoms together, and in higher degrees of identities a higher degree of life. Where bodies are separated by primary spheres of void matter, we must have gravity to bind them together before we can perceive heat, light or any other manifestation of force.

Therefore, force must organize and hold matter in two distinct material identities before we may perceive the action of force between them.

PROPOSITION II.

Every action of Force consists in the pushing of some material; it is a pressure, and never really an attraction.

A suction pump depends on the pressure of the atmosphere for its action. The rope that pulls the log is one with the log and with the motive power. But somewhere in the machine or the horse can be

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found that displacement of material which is the real source of power, and in the last instance it is ever a crowding of material particles for room. If it be possible, let it be otherwise, and let that which gives the power be an attraction of one material for another, such as magnetism is often deemed to be. (Hypothesis.)

Then, because the force is an attraction between the magnet and the armature, the intervening material has nothing to do with it. (Hypothesis.)

But that is impossible. (Axiom 2. Prop. XI, B. 1.) And because the magnet attracts without being itself altered, therefore the force is inherent in the magnet. (Hypothesis.) Then we can, with the aid of one magnet, make an unlimited amount of inherent attraction in material that does not yet possess it (tempered steel). (Hypothesis.) Where then, is the attraction, now, that with a few strokes of the magnet may be imparted to any jackknife?

This attraction of the magnet or any other attraction or drawing or contraction is apparent only, something somewhere must press and push; otherwise, that attraction is an occult attraction, outside of human reasoning and observation.

Therefore, the very word, "attraction," is mischievous and misleading, and in the investigation of any manifestation of force that material, which by expanding is made to require more room, ought to be considered. And, somewhere back of every force is such material, and back of that material

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more material, to the infinite circle of material, moved to infinite change, by infinite life.

PROPOSITION III.

Every display of force requires pushing on one side and yielding on the other side.

Force cannot be transmitted from one body to another body, when the two are in all respects equal. (Prop. XVIII, B. 1.) The irresistible force, pressing against the immovable post, will not produce action on manifestation until the post ceases to be irresistible. When the steam is turned on equally on both sides of the piston, the piston will not move, be the pressure ever so great.

Therefore, every action of force depends, in duration and intensity, on one body pushing and another yielding.

PROPOSITION IV.

Force is irresistible and instantaneous.

We speak of strength and weakness and measure our motive power in quantity and intensity. And often we forget that strong and weak alike are inseparable links of one whole chain; and, because we cannot readily trace the connection of one identity with the whole Universe, that identity is in-

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vested with a mysterious and often with an occult individuality.

And often we ascribe to an identical manifestation of force, like electricity, a nature apart from Mother Nature, and in the name of electricity think ourselves able to move Mountains, or manufacture identical life.

Whenever we fail to see the connection between an identical act of force and the whole universal force, there is surely not an upsetting of universal truth, but merely an example of our ignorance.

But the Frog that kicks the water with his hind legs, shall he not exert his influence upon the Morning Star?

Even as the Star, the Frog is surrounded by the infinite Congregation of Primary Spheres, each one of whom is in direct communication with every other Primary Sphere, and not one of which can move until a new space is provided for it. Then is every action of force at last resolved into a movement of Primary Spheres. And the question of intensity and duration, or distance of movement, is not a question of the speed and strength of force. But the real question is, "How many identities shall participate in the movement; how far shall this row of Primary Spheres go this way, and how far the other row in yonder direction, before some change in some living identity shall produce a contrary movement?" Force is infinite in extent. Nowhere in the Universe can there be a place where force is not. And material, likewise, is everywhere

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present. (Prop. I, B. 1.) Then can force, infinite in one respect, be limited in another respect? And what shall impose the limit upon it?

And a Primary Sphere is incapable of change, except that it may change its relative and its absolute position. Then it must either move or not move, but the must is an absolute compulsion. Neither can the action of force be delayed or prolonged, for a Primary Sphere may not stop to argue the point or yield a reluctant obedience.

Then, if manifestations of force require time, it is because every manifestation works through identities that are composed of particles which must change, one by one. And if one manifestation of force is weak and another is strong, we must look to those identities that are concerned in the manifestation for the reason.

In old mythologies one Deity is stronger than another. They divide heaven and earth into provinces between themselves.

Are forces likewise identical in their own nature, one stronger and another weaker, with occult inherent strength?

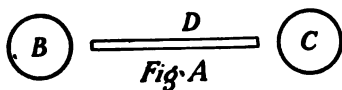
That idea belongs to the same old mythology. But a force that is displacement only, in our perception, must be infinite in origin, ever itself irresistible and instantaneous, while the manifested displacement is subject to time and distance.

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PROPOSITION V.

Force cannot be transmitted between two bodies in opposite directions at the same time.

Let Figure A represent two bodies, B and C, and let D represent a rod between them.



Then it would be absurd to suppose that force can move the rod in the direction from B to C, at the same time that force is moving the rod in the direction from C to B.

Yet it is sometimes held that a body receiving light or heat, from another body, does at the same time give to the body from which it received.

And the explanation involves some theory of force which divorces force and matter, for no wave even may go opposite directions at once. Because force always acts through the medium of material, and no material may go two opposite ways at the same time; therefore, force cannot be transmitted between two bodies in opposite directions at the same time.

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PROPOSITION VI.

Without movement there can be no action of force.

Every manifestation of force is a mechanical movement of material parts. (Prop. XXV, B. 2.)

Evidently every movement is a mechanical movement, and by it material parts are moved.

And yet the occult conception of forces will ever creep to the foreground with an attempt to substitute some hocus pocus, for the necessary flow of material, from the body that transmits force, to the body that receives force.

Force cannot be stored up, or augmented or destroyed. (Prop. XIII, B. 1.) Therefore, force cannot be dormant or consist of a dead pressure, but must ever be associated with motion.

Does the nail driven into the wall, and is holding up a weight, exert force? Certainly not. It is when the nail gives way and the weight falls that force is manifested. Let one end of a rope be fastened to a stump, and the rope passed through a pulley on a log. Then if a horse pull on the other end of the rope his power will be doubled on the log. But if the log will not move, the stump will come out just as readily as if the horse were hitched directly to the stump, excepting the friction of the pulley.

A dead pressure may be multiplied a thousand-

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fold, but that is not multiplying force. For every action of force implies motion, and every motion is a shifting of material in universal space. Therefore, when we multiply the intensity of any force, we must needs shorten the duration of the manifestation of that force, because in the last instance every manifestation of force consists in so much space vacated by one identity and taken up by another identity. Yet motion is not force, but the result of force acting upon material.

A pressure, a tendency, an attraction on any dormant potentiality or stored up energy, these all are not force, but the indications of a universal, ever-present force; the material bodies that possess these dormant qualities, they are simply ready and prepared, in the organization of their peculiar forms, to manifest the actions of a universal displacement motion. And only when there is a movement of material particles can there be a manifestation of force.

PROPOSITION VII.

The primary spheres of void matter have neither weight, nor that persistency in acquired motion attributed to inertia. Nor can any motion impart momentum to them.

Let any substance be heated. Then it will expand, and the resultant empty spaces between the particles will be filled up with spheres of void

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matter. But the substance will weigh no more after being heated than before.

Therefore, the void matter added to the substance had no weight of its own to add to the weight of the substance.

Again, because every substance is surrounded by void matter, and permeated by it, and all space not occupied by organized matter is filled by continuous void matter; therefore, void matter must balance itself everywhere, even as the air on top of our scales is balanced by the air under our scales. And stars and planets moved through void matter in fixed regular orbits, which would evidently be impossible if void matter possessed momentum and would persist in any motion acquired.

PROPOSITION VIII.

Every identical manifestation of force is at last connected, on both ends, with a movement of primary spheres in universal void matter. All force is universal force, and all motion is universal motion.

Force can act only between organized bodies of material. (Prop. I, B. 3.) But the body that transmitted the force did not generate that force. (Prop. XII, B. 1.) Neither was it stored up in the transmitting body. (Prop. XIII, B. 1.)

Therefore, the transmitting body gave that which

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it had first received, and the receiving body, being unable to store up force, must again transmit it.

We can trace identical manifestations of force, heat for instance, back through many changes in surrounding material, and forward through many changes that follow the original manifestation of heat; but nowhere can we find a material, being changed by heat, that does not by its own change produce farther change.

We trace every manifestation of force on earth back to the sun; but does not the sun receive while it gives, and does not the earth give while it receives?

Both sun and earth are surrounded by void matter, and in that same continuous void matter float millions of stars that shine upon the earth. And because we see their light we know that material must pass from each one of them to us. (Prop. XVII, B. 1.)

The sun that holds the earth in the grasp of gravity is again held and influenced by other stars, for the sun also moves, not in a straight line but in an orbit.

There are changes upon the sun; clearly our astronomers can observe them; but can the sun change his own spots?

Because the primary spheres of void matter penetrate all substance, and because all that part of the Universe not filled with organized matter is occupied by a continuous mass of void matter, therefore the spheres of void matter are every-

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where pushing on one another, and the movement of one must affect the whole mass. But the movement of any organized body must also affect the whole Universe, because such movement compels some other body to move, and finally the movement of organized bodies must come again to a movement of void matter.

The atoms of organized bodies are built up of primary spheres in closest possible contact; therefore, a primary sphere may not penetrate an atom. And if an atom, or an aggregation of many atoms in an organized body, change place anywhere in the Universe, several rows of primary spheres of void matter must be moved out of the way.

But where shall the primary spheres move to in a Universe that is full?

There is no vacant place behind the moving body, for something is pushing it. (Prop. II, B. 3.) If the moving body is not pushed out of its place by another organized body, then it must be by void matter.

While we can observe the movement and pressure of organized substances, even in the gaseous state, through almost endless notations, these movements sooner or later are converted into some so-called force. That really means, "The movement of bodies which we can directly observe is transferred to a movement in void matter, where we cannot directly observe movement."

And because primary spheres are incompressible

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and because the whole Universe is full of them (Prop. I, B. 1), therefore, a movement of any one or more of them necessitates the change of some body into its component void matter, and a simultaneous change of void matter somewhere else into organized substance. (Prop. XXI, B. 1.) Yet even where these two changing bodies are in close proximity, the movement of primary spheres between them is participated in by all void matter surrounding the moving spheres, in ever lessening distance of movement, as the distance from the bodies increases.

This may be readily seen by putting a number of round disks (coins, for instance) on the table in closest possible contact, and then moving any inside disk in any direction.

Again, our brain undergoes a change, when we see a star millions of miles off, and countless other identities suffer a change because of that same starlight. Then there must be a change of position of every P. S. between us and the star. And in every direction a change must take place.

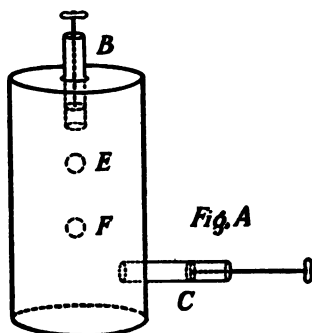
Therefore, every manifestation of force is at last connected, on both ends, with a movement of P. S. in universal void matter; all force is universal force.

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PROPOSITION IX.

Human reason cannot comprehend the infinite, nor determine the direction of an infinite universal force.

Let Figure A represent a cask filled with 1,000 gallons of an incompressible liquid. And let B and



C represent tubes with perfect pistons, and let the tubes also be filled with the liquid.

Then if a weight of 10 lbs. is put on the upper piston, there will be 10 lbs. of pressure on a like area of every part of the inside of the cask and the lower piston. (Pascal's experience.) But there will be no movement until something yields. (Prop. III, B. 3.) Let the lower piston yield. Then what part of the cask will the liquid go to that comes out of the upper tube, and where will the liquid come from that fills the lower tube?

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It is evident that every particle of the liquid in the cask is affected by the movement, and the bodies E and F floating in the liquid are also affected by it.

Yet it seems almost impossible to determine in what direction the particles moved that changed position, or how the position of the bodies E and F was altered, relative to one another.

Then if we can scarcely calculate the movement of particles in a very limited vessel, knowing the point where force enters, and also the point where force leaves the vessel, how can we determine the direction of universal movement?

For our Universe has no visible upper tube where force enters, and no lower tube where it is discharged, and where are the staves that may constitute the bounds of the Universe?

But let it be otherwise and let the visible stars and our solar system constitute the Universe, and let the Milky Way indicate the direction in which universal force moves. (Hypothesis.) Then that force must either move in a circle, or have an inlet and an outlet.

But force moving in a circle is not force at all, to any sane reasoning, for it would balance itself.

Then the Milky Way must have two ends, one where force enters, and one end where it is discharged. (Hypothesis.)

Then how are these ends situated relative to one another, and whence comes force to the Milky Way and whither does it go when it leaves? There-

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fore, however narrow our view, within it lies the infinite; "and if, on the wings of the morning light, we fly to the uttermost star," then lies before us and on every side the infinite, unfathomable space.

And if we bestow upon infinite force a personal identity, perhaps a name, where then is that above that 1,500 million humans point to in 1,500 million different and often opposite directions?

Therefore, the legitimate scope, wherein force may be considered, is in that part of the Universe from which we may receive material impressions, and between living, material identities.

And human reason cannot comprehend the infinite, nor determine the direction of an infinite universal force.

PROPOSITION X.

The limitation of identical manifestations of force through identical material bodies, and their relation to time and distance, is the result of the one law common to all matter, namely, "All matter must occupy space."

A unit of force requires a certain amount of work to be done in a certain time.

The amount of work or change performed, alone by itself, cannot be a standard, neither can time or distance alone be a standard.

For our mechanism may multiply one at the

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expense of the other, so that one pound lifted a hundred feet can be always made, by falling the hundred feet, to lift a hundred pounds one foot.

Yet there can be no amount of force, because force is irresistible. Neither can the action of force be faster or slower, for force is ever instantaneous. (Prop. IV, B. 3.)

Then how may these contrary statements be reconciled?

As far back as human memory runs not to the contrary, the two propositions, one that the infinite whole swallows up all identity, and the other that every identity carries within itself the infinite, have divided the world into two factions.

And under some party name or other have Pharisees and Sadducees disputed and fought about the relation of the individual to the whole, through all ages.

But all the wars that have been fought and all the books that have been written have not settled the question; a fatalist is still a fatalist and an anarchist is still an anarchist.

And science has never profited by pursuing abstract tangles, for true science deals with identities; it is the knowledge of changing forms, the tracing of one change to another change.

Therefore, let it be granted that force is irresistible and instantaneous, that Mohammed can move the Mountain if he will; and also that Mohammed is limited by his environment, that force is bounded in intensity and distance.

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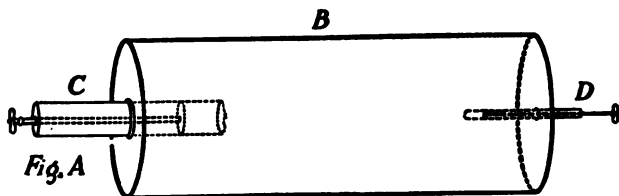
Then what is the real unit of force?

Because all force requires an inequality. (Prop. XVIII, B. 1.) And because all substances are built up of primary spheres. (Prop. XIX, B. 1.)

Because the primary spheres built up into organized atoms require less room in the Universe than they did in void matter. (Prop. XX, B. 1.)

Therefore, this change of matter, from its void state to organization is the origin of force, as far as human reason may comprehend. (Prop. XXI, B. 1.)

And the real unit of force is, "One primary sphere changed from void matter to organized matter, and the corresponding, simultaneous change of one P. S. from organized matter to void matter."



Let Figure A represent a modified hydraulic jack. And let B represent a large tube filled with water. Let C represent a rod ten times as great in diameter as the rod D; and let both rods penetrate the closed ends of the tube B through tightly fitting holes. Then for every pound of pressure put on the small rod, pushing it in, there will be a hundred pounds of pressure on the end of the larger rod.

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But if the tube B is filled with air only the pressure on the little rod will not be multiplied a hundredfold onto the larger rod.

Then it is evident that the comparative incompressibility of the water is a factor in the result. Considering the molecules of water as spheres of like diameter, if 10 spheres are in contact with the end of the little rod 1,000 are in contact with the larger rod. And all these 1,010 spheres and every other one in the tube are as close together as the intervening void matter will admit.

That the increase of pressure can be the result of one sphere slipping in between two others is out of the question, for that would mean an increase of volume.

Neither can the converging of the rows of spheres, from the lesser to the larger rod, act as a knucklejoint lever, for then the pressure would increase after the square, whereas it is equivalent to the simple increase of the larger rod over the smaller.

It is then evident that the pressure exerted on any one sphere, within the tube, is imparted, undivided and undiminished, to every other sphere.

And as long as the pressure remains a pressure only, it makes no difference how many spheres are involved in the whole pressure, for each transmits as a whole what it receives as a whole.

And the little rod of Figure A received and transmitted the pressure upon it as one whole to all the several spheres in contact with its end. But

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that total pressure is divided equally between all the spheres in contact with the rod.

Then how and why is that? Can anybody really understand the reason that the spheres do on one hand divide a total pressure, and on the other transmit all the pressure that each has received, to every other sphere in contact at once, undivided and undiminished? The lever distributes the whole pressure upon it on both ends, equally over the whole length of the lever; the pulley divides the total pressure between the stationary end, the several wheels and the identity that pulls.

And in every mechanical device there is this mysterious capability of several identities to divide a total force or pressure between themselves. Reversing the statement and saying "that each identity, or particle of a compound identity, has the capacity to add its received quota of force to the accumulative whole," seems to put the question in a clearer light; and yet there remain ever the why and the wherefore.

Then substituting for an imperfect hydraulic jack, with its medium of partially compressible water, a perfect Universe filled with incompressible primary spheres, it is at once apparent that every identity or organized body exerts any pressure put upon it as a whole, on all those primary spheres that prevent its movement. And these spheres divide the total pressure between themselves, and transmit it to every other sphere in the Universe undivided.

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Then considering that every organized body in the Universe acts precisely the same, the pressure would be equalized on all, and no amount of pressure can produce movement without unequal yielding.

And again this unequal yielding leads to the blank wall of the infinite.

But pressure is not force, neither is displacement force, but the result of force.

The infinite primary cause is without the circle of human reasoning, and this cause that is primary is the present force, and the moving power of every change that is to come.

For not an atom can change to combine, nor an ether particle move from its place in the Universe, until somewhere in the Universe the supreme cause decrees life to this one and death to that other.

But the changes in identities within the circle of our observation, these changes are a mechanical displacement, and the dead pressure that is on all void matter alike is converted into vital motion through the disorganizing of substance in one place and the organizing of void matter in another.

The mechanical changes in substances around us, the visible changes of position between the several parts of our machines, these clearly conform to the laws of displacement.

But every well known mechanical action is based upon gravity and inertia that are not really understood. Yet gravity and inertia are not occult forces, but they must be also subject to laws of

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displacement because they can act through matter only. (Axiom I.) It is then undoubtedly an advantage in the consideration of identical forces to look upon force as displacement; to consider so much universal space vacated as so much force brought into play.

And because every movement is connected on both sides with a movement of void matter, the question of intensity and duration of movement of any organized body resolves itself into the question, "How many organized bodies, and how many primary spheres of void matter are affected by the movement, and divide the total pressure between themselves?"

For a dead pressure becomes motion only when something yields to it, and before anything can yield it must have somewhere to go to. If the Universe were one whole body, then any change that it might undergo would have to be instantaneous.

But we cannot conceive how anything composed of particles can change instantaneously, when one particle must change before the other can move.

And because 10 spheres of water in our hydraulic jack cannot fill the whole space vacated by a thousand spheres of equal diameter, therefore, the ten must get 990 to help them; the little rod of Figure A must move 100 times as far as the larger to multiply the pressure upon it a hundredfold.

Then looking upon all manifested force, perceptible to us directly, as the result of displace-

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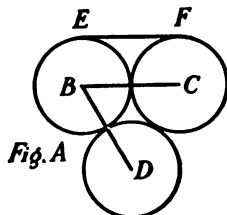
ment, the limitations of forces become a question of space vacated on one side and occupied on the other side, and how many primary spheres participated in the movement.

Because any manifested force is already preceded by innumerable changes, before we perceive it, therefore, we may justly look upon force as already brought into the relations of time and distance, before we perceive any manifestation of force. Then through the law that matter must occupy space, force that is infinite and instantaneous is limited in our perception to laws of intensity and duration of time and distance.

PROPOSITION XI.

Two lines drawn from the centre of any primary sphere, anywhere in the Universe, to the centres of two other P. S. in closed contact with the first sphere, together with all lines that may be drawn parallel to both of these lines, constitute a universal plane.

Let the circles in Figure A represent primary spheres.



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And let the line B C join the centres of the circles B and C.

And let the line B D join the centres of the circles B and D.

Let the line E F touch the outer edges of the circles B and C.

Then it is evident that the line E F which is parallel to the line B C cannot be parallel to the line B D that diverges from the line B C, except only in one direction, namely, the plane of this paper. And it is evident also that no other line can be drawn parallel to both the lines B C and B D except in a plane wherein any number of lines may be drawn parallel to both, although in every other direction they must diverge.

PROPOSITION XII.

Every manifestation of force whose intensity is decreased after the inverse square, or after the plain increase of the square, by the increase of distance between the bodies displaying the manifestation, is a displacement of P. S. of void matter in plane layers.

Light, heat, magnetism and gravity are transmissions of force from one body to another body, and always there are two bodies affected by them at the same time. And these manifestations often occur when there is no organized material between

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the two bodies, or through a vacuum, and plainly the transmission is through void matter.

Then whatever we consider force to be, if the transmitting body throws off this force in all directions, and the receiving body receives its quota from that sphere of influence, then the increase in distance must lessen the intensity of the force after the inverse cube. (Prop. IV, B. 2.) But while the sun shines in all directions, our eyes receive the light from one direction only, in any particular transmission, and the intervening primary spheres increase in number after the square and divide any vacated space between themselves. If the P. S. of void matter were placed all at right angles to one another throughout the Universe, then the increase of distance between two bodies under the action of force would mean a simple increase of P. S. involved. But the slightest movement would disarrange any such right angled arrangement. (Ocular demonstration.)

Again, no organized substance, not even gases, possess that uniformity of particles and freedom of motion necessary to the free play of force, transmission. Therefore, the transmission of force that conforms strictly to an increase in intensity after the square, or the inverse square, by a lessening of distance, can only be through plane layers of P. S., for a plane increases after the square. (Prop. IV, B. 2.)

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PROPOSITION XIII.

HYPOTHESIS. THE LAW OF LIFE.

Every identity, that possesses life or organization of any degree, must continually exchange the matter of which it is composed.

All life is a change, and human reason cannot comprehend anything that is incapable of change.

All that we perceive is brought to our perception by some change in the thing observed, which produces a change in us.

And always we associate life with action.

The living identities, whose life we can perceive, need nourishment to build up again that which was wasted. And when wasting and recuperation cease, the life that animated the identity observed is no more.

Science has recognized the application of this law of life to the human body, and to animal and plant creation. But iron and stone are still deemed without life, and subject to disintegration only through outside influences. Yet a dead thing cannot obey a law, and stone and iron obey many laws beside the law of displacement.

Evidently there is a marked division between the matter that composes celestial bodies and the matter that fills the space between the several bodies. The Mosaic philosophy makes the division

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of light and darkness a distinct act of creation, and certainly the void matter that transmits light, heat, gravity and magnetism is not affected by these forces as are either the source or the recipients of them.

The primary spheres of void matter cannot be made hotter or colder; they have neither weight nor capacity for momentum, because they are incapable of change, and every manifestation of force implies a change in the material that shows the action of force.

Then, in order to manifest force a thing must have organization of particles, and through that organization only can the thing be subject to change, when the particles are in the last instance ultimate, primary and unchangeable.

That this necessary change in organization can be effected through a loose about vibration, without an interchange of ultimate particles, is in the first place improbable, and upon closer investigation it is impossible. (Prop. XVI, B. 1.)

The circulation of the blood has been recognized for only a comparatively short period, and it seems now strange that any child should not know the fact instinctively; yet we hold that the inside of our green fir tree has been the same for hundreds of years. And the granite of our mountains we deem to be unchanged for ages. Yet all the while tree and mountain and human body have participated in the planetary life of the earth, and the smallest atom of them has been subject to gravity,

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to heat and magnetism; every substance is playing a part in the economy of nature.

Is it dead matter that exercises attraction upon other dead matter? Then is force an occult power, and all science guesswork of to-day, to be overthrown to-morrow by the last discovered occult power?

There is something going on in bodies changing through force, beside a mere widening and closing of interstices between particles. (Prop. XVII, B. 1.)

But in all those manifestations of force, where our reason can clearly, even if not directly through the medium of our senses, perceive a movement of P. S. from one body to another, we yet fail utterly to observe a diminution of mass in one and an increase in the other. The mere passage of void matter through two organized bodies cannot produce that inequality between them which is necessary to a display of force. Somehow the void matter must take hold of both bodies, and of each differently. There seems then no other hypothesis, except in those forces at least that have a strict relation to mass, that the whole mass is subject to a fundamental law of life. And the constant exchange of material, which we observe in complex identities, must extend to all organized matter.

Let it be granted that atoms as well as the most complex identity must continually exchange their component parts.

Then the question presents itself, does the whole

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atom die at once, or can the primary spheres composing the atom be renewed one by one?

Now, an examination of any form built up of spheres in closest contact will at once disclose the fact that spheres of like diameter cannot penetrate such a form. And if the form is made up of a considerable number of spheres, some of these will be surrounded by others, so that they cannot be removed without breaking up the form.

It is then evident that if atoms die at all, they die all over at once. An atom cannot grow, neither can it be dismembered and remain an atom. Therefore, it must be born as an atom, and birth, changeless existence and death is all that an atom can undergo as an atom.

The decomposition of atoms is beyond our direct perception, and therefore atoms have been regarded as primary identities.

But molecules, the organizations of the second degree, can be decomposed by various means.

And the organizations of higher degrees can be decomposed with ever increasing facility, as the complexity of the identity increases. Yet there are many indications of the dismemberment of atoms in the recorded experiments of modern scientists, and certainly light must either be an occult force, or the atoms of the sun must decompose to give light to the earth. (Prop. XVII, B. 1.)

There is, however, an apparent difference between the growth of the atoms in a stone at the beginning and a continual renewal of these atoms

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in the same stone, and even in the human body we do not generally mean a renewal of atoms when we speak of a renewal of the body, but rather an exchange of atoms.

But because every substance is at all times and in all places participating in the whole life of the Universe, therefore, every substance must share in the living and dying which makes up the world.

Then taking for granted that the hypothesis Prop. XVII, B. 2, is the truth, it necessarily follows that either the new atom is formed near the centre of a substance, where it can be surrounded by twelve other atoms while the outlying atoms are decomposed, or else all atoms are always in groups of twelve and the thirteenth one dies.

Atoms of all gases are apart from one another, but there is nothing to prove that the identity which chemists call an atom is not really a group of twelve.

And even as in the growth of complex identities (Prop. XX, B. 2), this hypothesis requires an ability of the groups of atoms to change the centre of force; for otherwise primary spheres cannot penetrate a group of twelve atoms touching one another, with their centres equidistant from one common centre.

Is then the law of life the result of an occult inherent power of organized matter? No, for identical form necessitates identical life, and identical life cannot be primary life. (Prop. XIV, B. 2.)

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Identical life, which is subject to human reason clearly is a mechanical result of displacement in universal material. And that displacement is the result of "one whole occult infinite life," universal and incomprehensible.

And of all forms that constitute organized material, no two are the same form, and no two forms that are not identical (similar) can manifest the same universal life in the same way. Therefore, the changes in material by force are based upon the fundamental law, that all identities that have life or organization of any degree must continually exchange the matter of which they are composed.

In many manifestations of force there is no increase or decrease of mass.

Therefore, nothing but void matter enters into the transmission of these forces through vacuums or between celestial bodies.

And when the intensity of the manifestation is subject to the law of the square, such manifestation must be a displacement of void matter in plane layers. (Prop. 12, B. 3.)

But the direction of a universal force cannot be determined (Prop. 9, B. 3); it is in every direction.

For in every direction lies the infinite.

And yet no Pantheism can satisfy human reason, and the largest possible aggregation of individual identities cannot in human reason constitute an identity that is the originator of the lesser identities.

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If the flow of void material is from the infinite to the infinite through all living identities, and the infinite lies in every direction, then both coming and going it must flow in every direction; that is, since matter cannot go in opposite directions at once, the flow must be in alternate plane layers, one layer coming and the other layer going. (Alternate hypothesis.)

An examination of spheres in a box will disclose the fact that they cannot all be in closest contact. When spheres are placed in closest contact in two directions or dimensions they are invariably at right angles in the third dimension.

And even the removal of a sphere will not permit a movement of the others. (Ocular demonstration.) Then any movement of P. S. must be considered as an absolute compulsion, even against the total pressure upon the whole aggregation of void matter.

Then since we receive impressions of force from every possible direction, it must follow that these manifestations of force are conveyed either by organized bodies or by P. S. of void matter in plane layers, or by both in physical conjunction. For there is no known force amenable to the law of the cube, in distance.

But who may figure out the sources of the winds, or the origin and life history of the waves that beat in a thousand directions?

And yet wind and wave are mechanical displacements, and each breath of wind and each wave are

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ultimately the result of a great normal movement of air and water.

Since many forces penetrate all known substance, and after thus penetrating are again amenable to the law of the square; from the uniformity of action in gravity observed in a vacuum, and from a great variety of other reasons, it appears that a normal flow penetrates all substances in plane layers.

And it is very safe to assume that nothing in nature can stop the normal flow, and that normal flow of material must constitute the last material the human mind can grasp. For that flow, acting upon organized forms, while breaking up every form and rebuilding it particle by particle, must itself become susceptible to laws of time and distance and therefore prehensile to the human mind. Then under this alternate hypothesis the infinite is the solid background, an identical infinite forever incomprehensible to human reason. And all identity of forms, all changes they may undergo constituting their identical life because of the universal flow, and even the changes of direction, of intensity or time, of that flow itself between organized bodies, becomes perceptible to human reason.

How do living identities exert their influence on one another, when none of them have inherent power, force or energy of their own?

The answers to this question constitute the material, real and progressive science.

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In investigating any machinery it is well to begin with the motive power. In searching nature it is well to settle the question what constitutes the real motive power of the Universe. And whenever it becomes apparent that there is an everflowing stream of void matter, flowing in alternate layers, through everything human reason can perceive, then all that living identities can do to one another, all the changes they can undergo, must be based on these currents.

No living identity has power of its own, not one of them can produce energy or destroy it; like the delicate parts of the elaborate machine, they can only modify and transmit the motive power.

Any atom—that is, any form built up of spheres in closest contact—when placed in a stream of spheres of equal size, flowing irresistlessly in alternate layers, must be torn up. (Ocular demonstration.)

And in tearing up, unless the spheres themselves be torn up, the number of spheres constituting the form will require more room.

Then in order to move out of closest contact they must shove an equal number of spheres in adjoining layers into closest contact, and the process must be repeated continuously.

Spheres in plan layers that are in motion occupy the same amount of space as if they were round disks of equal diameter, about $314/400$ of the total space. Spheres as close as they can be put to-

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gether will in an uniform aggregation occupy about (?) of the total space. Spheres in closest contact in the form of atoms will occupy about (?) of the total space.

It appears then that when an infinite fiat decreed motion there was no room in a world that was void and without form, it lacked about (?) of space. And the proportion of organized forms to the whole Universe would seem to be as (?) is to one.

A cessation of that irresistible flow would apparently again throw all P. S. in the Universe into the closest possible contact of aggregation of spheres, the layers would come closer together and all atoms would be unable to do anything but dissolve into the general aggregation.

Then since all things are at all times subject to gravity, through every change of shape, form or condition, all things must be subject at all times to some fundamental cause, some law that may appropriately be called the law of life.

And this change, constant and irresistible, must either be the result of an outside motive power, or of an inherent primary force.

A force inherent in matter is an occult force.

Force as a primary identity is equally beyond human perception. And that which is beyond we may not clothe with identity.

Then what is in the first place the manner of that universal flow of void material, and how does

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it in the second place engage living identities in the Universe? The true answers to these questions constitute all of science, and no human can ever get more than a passing glimpse of this ocean of truth.

Because of this ignorance, this inability to grasp all, man has ever turned to occultism and substituted for geometrical solution of problems a lazy turning over of the radical underlying questions, to inherent powers of material, or to motions the result of these powers.

The endless controversy between Pharisee and Sadducee can only be decided by the truth which is in neither one of these schools of thought.

The questions of the conservation of force and of the stability of the amount of ultimate matter in the Universe can never be solved, nor can they be fully and irrevocably recognized as truths, unless both are held as the product of an ultimate primary cause.

Force is known to us only as change, and every change necessitates a former change, and a change to follow. There is then ever a necessity for the infinite in all finite reasoning, and force becomes, in the ultimate equation of human logic, a flow of material from the infinite to the infinite. No subdivision of ether, no invention of new names and phrases, no discovery of unknown manifestations of force, can do away with the necessity of a solid background from which force may act.

Then either human reason must clearly recog-

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nize its own limitation, and accept an infinite beyond that limitation, without fruitless impossible endeavor to cross that limitation, or else be ever making new idols of clay to hold an inherent force.

PROPOSITION XIV.

Inertia is the result of the relations existing between every organized substance and the whole Universe.

Generally inertia is looked upon as a negative quality of all matter, and it is stated that matter can neither start into motion, nor stop moving by itself alone. And undoubtedly this is true. But there are other things said of inertia that are not true. And evidently the erroneous impression is the offspring of the fundamental misconception that an occult force or life can be inherent in, or bestowed upon, an identical material body. The law of inertia, that bodies moving by acquired force move in a straight line, is not a negative quality of matter, but a positive requirement of force. Again, it is stated that the tendency of bodies moving by inertia is to go on in a straight line forever. And that eternal tendency is, for the time being, ingrafted upon the moving body, until it is transferred to some other body. And the force that is moving the body is a separate portion of force; under this hypothesis it pertains to the particular moving identity only, and is cut off

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from all other portions of force that move other particular identities at the same time. And so natural seems this hypothesis and so interwoven with every day experience that it seems scarcely possible that this hypothesis is wrong. The brickbat, thrown at an offending head, leaves the hands of the thrower with all the force transferred from the thrower to the brick, and when the brick strikes the head, all the force is transferred to the head. And this transference of force from one body to another body may be traced backwards of the thrower infinitely, or rather it was always existing, and it may be followed on from the head that was hit, and it must go on hitting forever. And upon this hypothesis is built up the wave motion mythology of nineteenth century scientific evolution.

But the brickbat in its flight was not cut off from universal force, for it was acted upon by gravity. And on both ends of this force-manifestation it was connected with a movement of primary spheres in void matter. (Prop. VIII, B. 3.)

Again, the inertia of bodies is in strict relation to their mass, so that by the momentum acquired through a given amount of force, the mass of any substance may be most accurately determined.

Let a ball be suspended by a small wire or thread. Then a slight push will set the ball in motion, providing that the push is slow at first. But it will take a heavy blow to set the ball into rapid motion at once.

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And there is a perfect equivalent in the relative energy required, in the two cases, so that it will take exactly as much force to start a ball weighing 10 pounds with a velocity of 10 feet a second as is required to start a 100-pound ball with a velocity of 1 foot a second.

But can the ball, by itself alone, multiply or divide force? Certainly there must be something outside of the ball that participates in this multiplication.

Because force itself is irresistible and instantaneous (Prop. IV, B. 3), any identical manifestation of force can be amenable to laws of time and distance only through a multiplication of identities participating. (Prop. X, B. 3.)

The question really underlying a radical consideration of inertia is the same old question that has always been asked about and never answered—what is the true relation of the individual to the whole? And one party says there is no individual, and the other party says there is no identical whole.

Can force move from one body to another body and through an infinitely great number of bodies back to the first body?

However theologians might answer such a question, a reasoning based upon impressions received through changes wrought in matter by force cannot admit any number of bodies to be an infinite number. Neither can any body or particle be without size. Therefore, as far as human reason

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can go, there must be an end, however long the chain of bodies that receive force one from the other. And beyond this human reasoning lies that which is forever beyond. And if two ends are brought together, of any number of bodies, there cannot be a manifestation of force between the bodies.

And so the force that seems to be stored up in the body moving by inertia is derived from the infinite and must return to the infinite. And the moving body is not cut off from force and cannot be in a Universe that is full; something is pushing the flying brickbat even in its flight.

There is a spanning, a tension in the Universe, for nowhere can there be within it a place where force is not. And because every substance joins some other substance, or joins the great aggregation of primary spheres of void matter which surrounds and penetrates all substance, it is apparent that nothing material can ever get outside of the tension of the whole Universe.

Even as it is impossible for a particle of water in the hydraulic jack to escape the pressure on the whole of the water.

Therefore, the body moving because of inertia is at that time as well as at all other times subject to the laws of displacement; it must move everything else out of the way, and something must immediately occupy the space vacated by the moving body.

When the movement occurs through an organ-

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ized substance, as air, for instance, the substance itself will be changed to some extent, and the study of inertia will be complicated because of these changes.

But any organized body, moving through strictly void matter, must push before it every plane layer of primary sphere that the atoms of the moving body encounters.

And these spheres cannot slip in behind the moving body, for there is no room to slip, and if it were possible that the spheres could get behind the moving body, then the force would be equalized in front and behind.

Therefore, the P. S. that are pushed out of their place must move on in the same universal plane until absorbed into some new forming body, or to the infinite.

And the P. S. that occupy the vacated space of the moving body must come directly from the infinite or from the disorganizing of substance into void matter.

And that flow of void matter must continue, even after the first impulse is given, as long as the motion continues.

While this theory of motion and inertia seems on first presentation to be a mere pipe dream, it is nevertheless supported by many observed facts. And it seems possible that another Newton might prove the theory as the theory of gravitation was proven. The movement of spheres in plane layers is within the scope of geometrical demonstration,

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but perhaps it will require great study to understand the effects of numerous movements in various directions at the same time.

That there is something outside of a moving body, which takes part in the phenomena that are the result of inertia, is plainly indicated by a spinning top, by the gyroscope and pendulum.

Let a heavy ball be suspended from a great height by a fine wire. (Faucalt's experiment.) Then after the ball has been carefully started to swing in a perpendicular plane, it will keep on swinging for some time in that same plane, even when the turning of the earth has made that plane otherwise than perpendicular. But at the end of every upward swing the inertia (or momentum) of the ball is fully exhausted, and gravity only brings the ball back down. And the tendency of gravity is to push down to the centre of the earth, or in a perpendicular path. Then clearly the ball moves in the first established plane because that plane has something to do with the movement of the ball, for certainly the ball that is no longer moving by inertia cannot then do this or that because of any supposed inherent inertia.

Then whatever the movement of void matter, caused by bodies moving in spheres really is, that movement is the real cause of the momentum acquired by moving bodies. And this brings inertia into relation with time and distance; and, because of the Law of Life, that all substance must change component parts, even a two-fold motion by inertia,

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like a rifle ball in its flight, may be brought within the scope of investigation.

That negative inertia, or rather the positive capacity for acquiring momentum, is a quality of ponderable matter only, seems self-evident

And yet, the unseen void matter must ever participate in every movement of any substance, or else every movement of any material, organized body, must ever be the result of an occult force animating that body for a time.

It is the unseen only that opposes our physical efforts, for Motion is not Force; a baby can move two thousand tons ten thousand feet an hour, if they are perfectly balanced, a thousand tons on each arm of a scale. And the baby may even start that motion.

And so the whole material Universe may be conceived, without effort, without outside assistance, without lubrication, without anything and everything, except motion.

And yet, there is labor and resistance and effort and travail, and this only is life.

The glorious gospel of nothingness will not shovel coal, and the universal vibration of ions, without background, or beginning or end, is occultism, pure and simple. For, in that vibration, there is nothing to make one aggregation of ions different from another, except an occult identity bestowed upon this or that aggregation, prompting an identical synchronic dance of vibration, which makes of that aggregation a physical identity.

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Nothing has really been learned in that line of thought about inertia. Nothing can be learned about a mere negative. A negative is nothing, in itself, and can lead to nothing, and all that can be said about it amounts to nothing. Motion is not force. Force is not an identity in its manifestations. Time and distance are not identical positives. Physical identities are not positive, unchanging identities.

Where, then, is that Positive that can make of correlated negatives a positive, identical life? That can compel and resist and dismember and reconstruct?

This Positive, over and beyond motion and Matter and manifested Force, beyond reason and comprehension, that all-embracing, infinite Identity, this is not and cannot be, a mere aggregation of individually occult identities. In all the Universe, there is not anything higher than conscious Identity. And yet we see conscious identities limited by material conditions; their very consciousness a product of changing Material. May, then, any Identity, supreme only in consciousness, be a joint author of that to which he is subject in his limitations?

The very Supremacy of Consciousness argues its Oneness; the conscious "I" can neither split up nor combine.

Then this, which is the All Positive, above all changing material, not the product but the infinite

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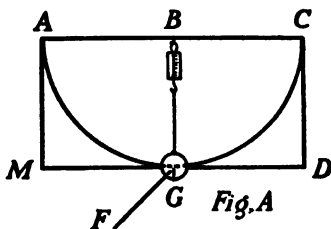
cause of all identical life, shall this, in our conception, lack conscious Identity?

We may not assign to the infinite either time or place or limitations. We may not determine direction or beginning or end. We may not grasp an infinite consciousness with our own limited consciousness, for our limits are material limits.

Is then the mighty play of momentum in stellar space, in wind and wave and in the still small voice of the growing flower an infinite momentum broken into innumerable pieces, to be reunited or again split up, at the dictates of material identities with occult powers?

Or is momentum a mechanical displacement of organized matter, by the power of an unseen displacement in void matter? Under this last Hypothesis, let the momentum of a pendulum be considered.

Let B—G in figure A represent a pendulum, and for a portion of the string substitute a spring



scale. Then, when the pendulum weight is drawn up to C and released, gravity will tend to draw the weight in the line C—D.

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But the cohesion of the string will not permit a straight descent, but will compel the descent in the circular line C—G. And, as plainly indicated by the scales, the pull of the weight on the pivot B will be nothing while at C, and the full amount of the weight while it is at G. And, to some degree, and in some manner the acceleration of the fall is counteracted by the increase of pull on the pivot. Then, under the force storage theory, during the whole of the descent, the occult attraction of gravity creates, and stores up in weight, the new tendency momentum. And this new created tendency is supposed to confirm to well established and generally accepted laws. [Its intensity and amount are determined by the mass of the pendulum weight and by the velocity of its motion.] [This tendency prompts the body, moving by momentum, to go on in a straight line and no other line.] [This tendency is eternal from the time of inception.] [This tendency of momentum can be transferred to other substances, and intensity and amount are interdependent.] Then, during the whole of the descent, gravity creates the new power momentum, while yet the newly acquired momentum is already exerting its power to move the weight in a straight line. And, while during the whole of the descent gravity acts in lines parallel to the line C—D, the line of the action of momentum becomes more and more divergent, until, at the bottom of the descent, it is at right angles to the line of straight descent C—D,

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namely in the line G—M. There is then, at the beginning of the upward swing, no tendency of gravity to move the weight in the circular line G—A, and all the force of momentum is in the line G—M. Then, since each is a tendency only, under this hypothesis generally accepted, the resultant tendency from the blending of the two equal tendencies must prompt the weight to move in the direction of the line G—F, which bisects the angle formed by the lines of the action of gravity and of momentum. Undoubtedly the weight will move in the line G—F, if the string is cut at the moment when the weight of the swinging pendulum is in the line B—G. It is the restraint of the string only that prompts the weight to ascend in the circular line G—A.

Therefore, the three negatives, gravity pulling away from the line G—A, momentum pulling away from the line G—A, and the cohesion of the string preventing gravity and momentum to have their way, this alone produces the positive movement of the pendulum weight, in the line G—A.

How this dead restraint of a dead string can alter the direction of a vital power, without bringing into the performance other identities that are really in a movement of displacement, can only be answered by the sophistry of occultism.

The restraint of the string does not detract from the amount of the momentum. The weight will go up virtually as far as it came down, and that is all it would do under any circumstance

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of straight descent or cycloid path with any contrivance.

The difference in time between the several modes of descent, while based theoretically on the accumulative power of momentum, presupposes an occult capacity in material to take up additional power without undergoing a physical change, under the occult hypothesis so commonly held. In the descent, of the pendulum weight, one-half of the power of gravity is counteracted by the restraint of the string; it begins with nothing and gets up to the full weight as shown by the scale, yet neither is the circular path twice as long as the path of straight descent, nor is the power of momentum one whit less. It is supposed to be a dead attraction of gravity only that accumulates momentum in the descending weight. And that momentum is again only an occult tendency.

But there is in the swinging of the pendulum a uniformity of motion that is irreconcilable with the theory that momentum is stored in the weight. For in the downward swing momentum plus gravity pulls, and in the upward swing momentum minus gravity does the work. Yet, eliminating friction and air resistance, upward and downward swing are equal.

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PROPOSITION XV.

Gravity is the result of a continuous flow of void matter, coming from the Infinite and going to the Infinite; and through the process of life engaging every living Identity in the Universe.

Gravity is a force that strictly conforms to equal effects on equal mass (Newton's Demonstration). Therefore, the whole of any and every substance is affected by gravity.

Gravity strictly conforms to an increase, in intensity, after the inverse square, by a lessening of Distance between bodies (Newton). Therefore, Gravity is a displacement of Primary Spheres of void matter in plane layers. (Proposition XII, B. 3.)

The use of the word attraction in connection with Gravity, and the promulgation of the modern wave theories, have created an impression that Newton's great work consisted in the Discovery of an occult power, inherent in all matter, and exerted through nothing at all.

Yet Newton believed that no intelligent man would fall into such an error. (Newton's Letter to Hallet.) And evidently Newton believed in a last essential quality of all matter, for otherwise, "The Mass of any Substance" can have no real meaning.

Looking upon Gravity as an occult attraction, there is nothing possibly to be learned about it,

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except the recognition of the manifestations of that attraction. And nothing has been learned about Gravity since Newton's day, and there is no known way of converting Gravity into any other force, or any other force into Gravity.

Yet there is, in human nature, a half-dead instinct that weight can be lessened by deep inhalations, and many birds sail in a manner to defy all our estimates of aeroplane results, from a given amount of force and air-resistance.

And there is a widespread belief in the possibility of the conversion of universal force, through human ingenuity directly, into mechanical and chemical energy for the use of men.

That Gravity furnishes the necessary stable background for the action of other Forces can readily be seen, and looking upon all Forces as a displacement of material, brings all Forces in relation with one another, in common origin.

But let it be otherwise, and let Forces generally and Gravity in particular, be occult Forces—that is, something that can work where there is nothing to work upon. (Hypothesis.)

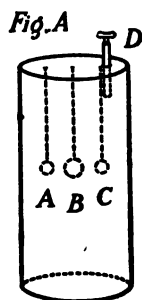
And let Fig. A represent an air-tight vessel with three balls suspended from the top by small strings. Through the stoppered tube D exhaust all the air contained in the vessel. Then there remains in the vessel nothing but the suspended balls and void matter.

And Gravity that causes the balls to attract each other must either work through nothing at all or

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through the medium of the void Matter. Let it be granted that the former is the case. (Hypothesis.)

Then beside the general and main attraction of



the earth, each ball has an attraction for the two other balls, which may be measured with very delicate apparatus.

And because this attraction may be measured it is a finite power, just so much pertaining to a given Mass and no more. Then after the balls A and B have been brought into actual contact, that attraction between them is satiated, and a certain amount of their whole attraction must be held dormant in the embrace of each other. (Hypothesis.)

And as far as superficial observation goes the Magnet and Armature illustrate this hypothesis.

But the attraction of the balls A and B for the ball C is exactly as great at a given Distance, when

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both are united in one homogeneous mass, as is the joint product of both their attraction when separate, and at the same distance.

Therefore, this hypothesis, that the attraction of Gravity is exerted without the medium of material of any kind, is erroneous, and contrary to human reason, because such a power is occult and infinite; it cannot be limited nor amenable to any law.

Then because that tendency of the balls in Fig. A to come together is the result of some change in material, and the only material between the balls is void matter.

Therefore, the immediate cause of the attraction is a change in void matter.

Then because void matter penetrates all substance the P. S. of void matter can go in or out of the vessel of Fig. A. And any pressure from the outside must press equally on all sides of the balls, and therefore no amount of outside pressure alone can create the tendency of the balls to come together. The only means, in our knowledge of mechanics, to create such a tendency is to make the pressure between the balls less than it is on the other sides of the balls. Then how is this done?

Evidently there must be a change in the balls also, as well as in the void matter surrounding them. And that change must be going on unremittingly, for the tendency to come together is constant.

But the structure of a ball is not changed by the

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prolonged action of Gravity, neither are the Chemical properties nor elementary Constitution of the ball changed by gravity.

Nor yet is there any accumulation of Mass in bodies acted upon by gravity, as far as we can observe. And still there must be; there is a change, and the only change possible seems to be an exchange of the Primary Spheres held in the constitution of the balls in Fig. A for those P. S. that make up the aggregation of void matter surrounding the balls.

Let it be granted that the Hypothesis of Proposition XIII, B. 3, is a correct statement of the fundamental Law of Life and action.

Then there will be neither gain nor loss in universal space occupied, by an exchange of P. S. in any substance undergoing a change in the process of life, the same number of P. S. will constitute the Mass of the substance.

And apparently there is nothing gained by substituting an occult life, of a substance acted upon by gravity, for an occult power of attraction; and this would seem to be implied in a theory that gravity is the result of a continuous change in all substance.

But an occult identical life of any material form is impossible (Prop. XXIV, B. 2) and the process of life in identical material substance is a mechanical result of universal, infinite life. (Prop. XXVII, B. 2.)

Therefore, there is no flow of void material

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because of the change in the process of life, but life and change and manifestation of Force are the result of a Constant Flow of void Material from the Infinite to the Infinite.

And this flow of void material cannot penetrate atoms, but must either take the atoms along in the general current, or pass around the atoms, or dismember them.

It seems as if the mechanical necessity of whatever change is going on in material substance ought to be capable of being demonstrated geometrically, when that change is the result of the movement of void matter encountering created forms.

But certainly there is no universal space added or taken up where there is neither decrease nor increase of Mass.

And yet somewhere in the material Universe there must be, simultaneous in two organized bodies, an increase of Mass in one, and a decrease of Mass in the other.

We cannot detect any increase in Mass in the balls of Fig. A. Neither can we observe an increase in the Mass of our Earth. But in the explosion of various substances there seems to be a total decomposition into void matter; and in the case of meteors there seems to be an increase of Mass out of void matter.

And while gravity undoubtedly furnishes the stable background for all other manifestations of force, yet these other forces are stronger than Gravity.

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Because of Gravity we walk, and yet every step lifts our weight in spite of Gravity.

And while the action of Gravity in the pendulum seems to argue a definite swiftness in the current that causes gravity, it is still evident that other currents of the same void material may by some other cause proceed in a contrary direction, or if in the same direction move faster or slower.

But if Gravity is an occult attraction, battling with other occult powers for mastery, there is the endless mythology of human imagining.

While Newton advanced no theory of the cause of gravity and professed himself ignorant of its real nature, yet Newton held light and heat to be caused by a flow of material of some kind.

And because there is no increase of mass in bodies through heat or light, Newton's theories regarding them have been rejected. And motion has been set up as the cause of nearly everything.

Yet there can be no motion where there is no material to move, and motion can be made in plenty without apparently conveying any force.

But even our kinetic theories have not been extended to Gravity, and all that is known may be summed up in the German phrase, "Es ist halt amal so."

And yet we may clearly perceive that there are certain factors which make up the sum of gravity.

First and foremost, there is a flow of void material.

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Second, there are a vast number of living identities.

Third, there is a constant transmission of force between these identities other than gravitation.

Fourth, every one of these force transmissions is connected with time and distance.

Fifth, Gravity also is connected with time and distance, and therefore it must work, not as occult powers which cannot be connected with time and distance, but through intervening material particles.

And somehow or other the reason of living identities rejecting one set of Primary Spheres embraced in a group of twelve atoms, and one atom after another dying in the process of life, to be immediately replaced by another atom built up of a fresh set of P. S., must be ultimately connected with time. If we could imagine that Primary Spheres could be held in the constitution of Substances for a definitely limited time only, then we would concede in substances, or to the Primary Spheres at least, an occult life. But life is not an occult identity, but a result of changing material, and identical life cannot set beginning nor end of its own existence.

Let it be granted that all living identities must continually exchange the P. S. of which they are composed, and let it be granted that the Alternate Hypothesis is a correct theory of the manner in which the Exchange takes place. (Prop. XIII, B. 3.)

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Then because all substance is built up of P. S. (Prop. XIX, B. 1) ;

And the change of void matter into organized Matter provides more room, while the change of organized Matter into void matter requires more room (Prop. XX, B. 1),

Therefore, the dismemberment and reorganization must be simultaneous in the Universe, and in any identity wherein it takes place. (Axiom 3.)

Again, because every change of organized bodies in that which constitutes their organization must be particle by particle, therefore every change in organization requires time. (Prop. XV, B. 2.)

Therefore, any current of void spheres effecting a change in organized substances must be checked up in velocity. (Theorem.)

This is in a manner illustrated by every current of wind and water. If two floats are suspended by a long string, in a current side by side, some distance apart, the current will soon make them come together. Or if two floats are connected by a string and turned adrift, down an even current, one ahead of the other, they will soon be together.

Then under the alternate Hypothesis any organized body of material, anywhere in the Universe, must lessen the velocity of the alternate flow in its vicinity. But this checking up cannot alter the normal velocity of a universal current (normal to that vicinity) any more than a boat anchored in the Mississippi will govern the amount of water discharged by the river. Evidently then when

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there is a checking of the normal velocity by the obstruction offered by the body, there is at the same time, in close proximity, also an increase of velocity over the normal.

And this abnormality produces the necessary inequality between bodies suspended in the alternate Current. Let Fig. B illustrate the working of an alternate Current in plane layers obstructed by the bodies *a* and *b*. Let the arrows indicate the direction of the alternate current. Then it is plain that there will be created a real tendency for the body *a* and *b* to come together; not an occult attraction, but a mechanical necessity.

And however many bodies may be concerned in obstructing a universal alternate Current, they must each and every one produce this tendency. And while an infinite stream of Primary Spheres cannot be conceived, or brought into any normality of time and distance, still in its operation between material identities in the Universe it must be normal to any solar system, and in fact to the vicinity of any separate body.

The increase of the intensity of gravity after the inverse square, by reduction of distance, is not at all contrary to the foregoing theory of gravity. For the displacement is not directly between the two or more bodies concerned, but rather it is a secondary effect of the greater displacement of a normal universal displacement.

And so an ever-present normal current can produce various motions by displacement that are per-

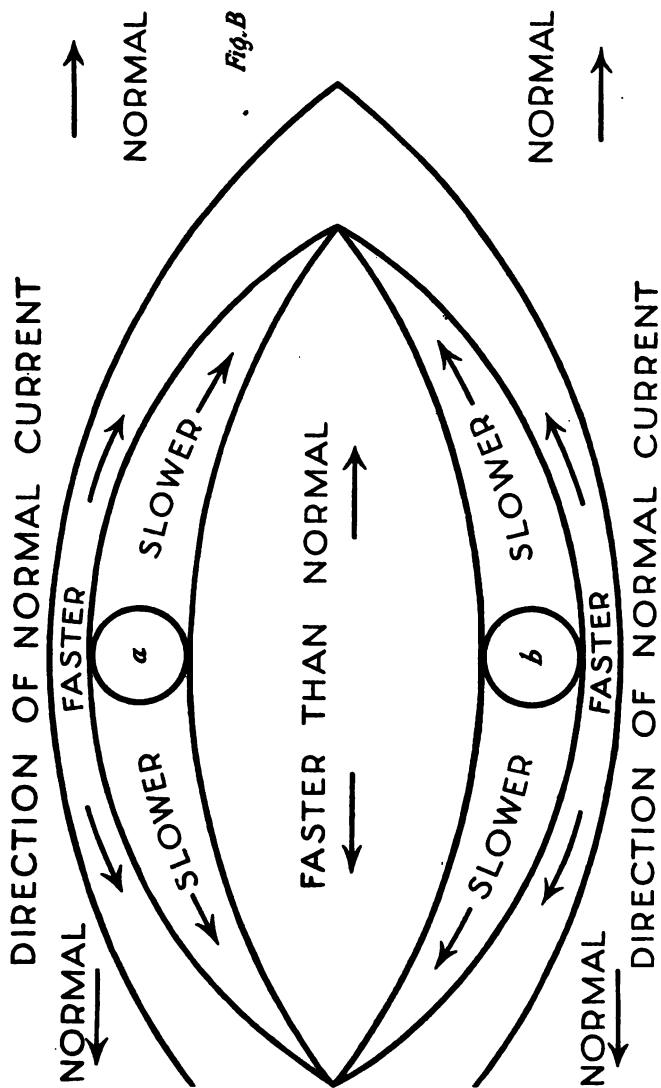


Fig. B

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haps contrary in direction; even a steady flowing stream can, by the obstructions placed within it, drive a chip in any direction, even upstream.

PROPOSITION XVI.

The cohesion of the particles of a substance is a direct result of the reproduction of atoms by an universal Current of void matter, and of the interlocking of particles in solid substances.

Cohesion is that quality, pertaining to certain states and forms of matter, which unites the several particles into one homogeneous whole. And the generally accepted idea is that it is inherent in the particles, an attraction of one particle for another. It is stated that cohesion works at infinitesimally small distances only, distances so small that science can determine next to nothing about them.

The particles that do cohere are not the atoms only, but in a greater measure the organizations of higher degrees.

That cohesion is not a family affinity, or liking of one particle for another of the same elementary substance, is plainly proven by the well-known fact that substances elementary different, by being brought together by fusion, exhibit more cohesion than either substance by itself. There is no absolute measurement of cohesion. Cohesion does not in that sense pertain to mass that gravity does.

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We cannot measure cohesion by mass, or mass by cohesion.

Taking for granted that the attraction theory is correct, it would seem that the closer particles were brought together, the greater would be their power of cohesion. Such, however, is not always the case.

For while the withdrawal of heat always brings the particles of substances closer together, it does not always increase their power of cohesion.

Iron, wood, steel and glass and numerous substances will show more cohesion at a hundred degrees of heat than at zero. Particularly does glass in a semi-liquid or viscid state show more power of cohesion than in any other state.

It is apparent that cohesion cannot be considered as amenable to the inverse square or cube.

Our notions of hardness, of temper, of ductile strength, and capacity to resist crushing strain, are more or less hazy and mixed up.

And the laws and formulas governing strength of material are arbitrary and uncertain.

The thousand and one problems, growing out of a consideration of cohesion, can never be solved under the Hypothesis that cohesion is the result of an occult attraction. And the data obtainable for a study of cohesion is decidedly meagre, for every substance, and every part of every substance, is a law unto itself in cohesion. Then a rational consideration of cohesion can consist only in a study of the forms of substances, and of that which con-

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stitutes and maintains form. Such consideration ought to start with the first degree of organization, the atom. For if the atom is considered as built up from Ions or from Primary Spheres, if it is the basis of subsequent organizations, the Atom must first possess cohesion of particles, or else there cannot logically be any cohesion in that which is built up of atoms.

What then is it that keeps the particles together in the organization of the Atom?

And that cohesion of the particles of atoms is paramount to any subsequent cohesion, for in every degree of organization after the first, human ingenuity has found means to overcome the cohesion and reduce them to the organizations of the atom. If we are to concede a primary Identity of atoms then we must also concede that force manifestations between material identities are occult demonstrations. (Prop. XIX, B. 1.)

As far as human reason goes all change and all life is reproduction; and it is the action of infinite force on finite forms alone that can reproduce these forms. And as far as unorganized matter participates in the reproduction of organized forms, the void matter can only participate through a change of position. (Prop. XIV, B. 2.) Since the atom is the first degree of organization, it can only undergo two changes, a change of relative and positive position, and dismemberment into component spheres.

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A stream of void matter going in one direction only, and encountering organized form, must undoubtedly produce a direct concentration of Mass, which is evidently not the case.

A vibratory current—that is, a current reversing its direction in a fixed time, might be considered, but offers insurmountable difficulties.

But an alternate current must disrupt atoms always, even if there were only one Atom of five spheres in a place by itself. But in that case there would be no mechanical necessity of reproduction, for the sphere sunk into the cavity produced by the conjunction of three spheres would pre-empt the space belonging to one sphere in a moving plane layer, and in rising up to slip out of the cavity it would not crowd any other sphere. But Hydrogen, from many indications the first in the series of atoms, and composed of five Primary Spheres, is not found, in any evolution of Chemistry, by itself, but always in a molecule of two atoms. While the particles of a gaseous substance are apart from one another (Prop. IX, B. 1), yet in some manner they are in conjunction, and we cannot perceive a single atom of any kind. For gases and vapors confined in vessels are amenable to uniform laws of pressure and degrees of heat. And, therefore, the void matter filling spaces, between the particles of gases and vapors, must participate in any dismemberment and reproduction of atoms in gases and vapors.

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But in any gas, and even in liquid substances, the manifestations of cohesion are feeble. Their particles cannot interlock (Props. VII. and IX, B. 1) either in the atom or in higher degrees of organization; and any intervening void matter has apparently a chance to move in a variety of directions.

In the solid state of substances, wherein cohesion is most strongly shown, the component atoms must first be held together, in the strongest bond of cohesion, before there can be any interlocking. Because the particles of a solid substance are in contact with one another (Prop. VI, B. 1), therefore, when any one atom is dismembered, by an alternate current, the spheres that composed the atom will require more room and therefore will prompt the organization of a like number of spheres. And evidently the process will be repeated throughout the whole substance. Then there must be either a general scattering out, of liberated spheres, against the whole tension of the Universe, into an infinite beyond the Universe, or there must be produced a confinement, of the reproduction process, to the space occupied by the substance.

This is the true cohesion, not an occult attraction of particles, but a mechanical necessity produced by an alternate current of void matter encountering organized forms. And from such encounter must spring the variations of velocity in a universal current between organized Identities.

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Because atoms are not round (Prop. VI, B. 1), their pertuberances and projections must engage one another, and again the whole tension of the Universe must prevent the scattering of identities of the second and farther degrees of organization. And the more complex any identity is, the greater will be the interstices between parts composing its highest degree of complexity, and, therefore, in a greater degree subject to dismemberment.

The study of cohesion from this standpoint offers an enticing field for investigation and invention. The tempering of steel, the annealing of glass, the crossing of fibres, all these and many other problems would be greatly advanced by a true knowledge of the nature of cohesion.

And in the study of heat, magnetism, light and electricity a knowledge of the form assumed by atoms of elementary substances would be of inestimable value.

Yet such knowledge cannot be acquired under the theory that atoms are primary identities, or the result of a synchronic dance of vibration. The atomic theory has been of great advantage to practical chemistry and has made of it almost an exact science.

A further step would be a recognition that the forms of atoms are no more similar than their atomic weights.

And by successive approximation, guided by atomic weights and by valence and periodical laws, a laying together in closest contact of equal spheres

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ought to find the law of series which undoubtedly underlies the increase of atoms from the lightest to the heaviest.

PROPOSITION XVII.

Heat is an increase of the magnitude of interstices between particles of substances, against the opposition offered by gravity and the interlocking of solids.

There are many changes produced by heat in material around us, that we may compare with each other, and with changes produced in the same material by other manifestations of force.

The foremost of these changes is the expansion, of every known substance, by heat, and the subsequent contraction by the withdrawal of heat.

And there is an equivalent between heat and expansion so perfect that our measurement of heat is based upon it.

The theories of the nineteenth century have reduced heat and other forces to wave motion and have found a solution of the mystery of the differences between the several forces in the length and rapidity of the waves.

But all waves are composed of material, and back of the waves must be the force that moves the waves, and the waves must depend in length of motion and rapidity of motion, not on the waves

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but on that which produces the pressure on one side and yields to the pressure on the other side.

And a continuous transmission of force can be accomplished only through a continuous flow of material from the transmitting to the receiving body.

Therefore, something must pass away, from the body that is cooling and contracting, and something must be added to the body that is expanding by heat.

And this something must be material, for if force can be added to an identical body without an addition of material, then that force is an occult force, working without material, and, therefore, beyond human reasoning.

Then because that added material does (Axiom 1) not add weight to the substance heated, it cannot be organized material; it must be void matter which is not incorporated into the constitution of the heated body. Yet it is incorporated into the bulk of the substance heated; and to that extent it must be conceded that there is an actual addition of material to the heating substance. That these P. S. which are added to a body expanding by heat come directly from a cooling body does not seem necessary, when it is considered that the Universe is an immense reservoir of Primary Spheres.

Evidently heat is a property pertaining to organized matter only, for if ether were capable of being changed by heat—that is, heated up or cooled

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off—all the Universe would soon be of a uniform temperature. And organized substance is influenced by heat only because of its organization; therefore, a real understanding of that organization alone can confer a full knowledge of the real nature of heat.

All life is manifested under a degree of heat; we can conceive of no life under an absolute zero.

The changes produced, in material around us, by heat are of an almost endless variety; and because of the interlocking of solids and the peculiarity of form of every substance, the passing of heat from one body to another is often obscured and seemingly doubtful.

Friction, electricity and chemical combination produce heat; we get a notion that they manufacture it. But all three produce light also and other forces. And if we can look close enough we will probably find that the bringing together of particles, which these forces accomplish incidentally, is the origin of the heat observed.

As compared with Gravity and Inertia, heat is not so strictly related to Mass. For although it takes a certain invariable amount of heat to raise a given Mass of any one substance through one degree of heat, the same amount of heat will not raise an equal Mass of another different substance through just one degree of heat.

It will take more heat to raise a pound of granite through one degree than is required to raise a pound of iron through one degree.

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Neither is the amount of heat required to raise a substance from the freezing point of water to the point where the substance is turned to vapor, uniform for every degree of heat. The lighter a gas the more heat is required to raise a given volume, under equal pressure, through one degree.

Therefore, it is apparent that the Mass of the substance is not all that enters into, and is concerned in, the phenomena of heat. And the changes produced in substances by heat cannot be a fundamental change in the Atoms alone, although based upon them, but the changes must involve the organizations of the second degree, and farther on in the scale of organization. Plainly we can perceive that Molecules are dismembered by heat, and our ball of butter or of lead will be changed in visible shape even by heat.

The particles of solids are interlocked and each solid substance is a law to itself when it comes to expansion by heat.

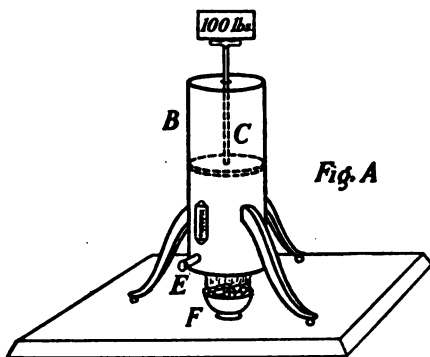
And liquids possess some degree of cohesion and each identical liquid has some individuality under expansion by heat.

But all gases and vapors expand at the same uniform rate by heat, and therefore offer the clearest view of the problem of the nature of heat.

Let Fig. A represent a metal Cylinder B, with a tightly fitting piston C, whose rod projects through a hole of the cylinder, and with a thermometer connected with the inside of the cylinder. Let the Cylinder be pumped full of any gas or vapor,

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through the small stoppered tube E. Let the gas or vapor be at any convenient temperature, while the piston is down within 30 1-3 inch of the bottom of the Cylinder. Let a constant pressure be exerted



on the piston through the means of the 100 lbs. weight. Then if by means of the basin of burning charcoal, or by some better means, the temperature of the gas is raised one degree, the piston with its constant pressure of 100 lbs. is driven out 1-9 of an inch. And this expansion (that is, 1-273 in volume) will be constant under constant pressure, for every gas under any degree of heat while the gas or vapor remains such. And reversing the experiment—that is, by increased pressure to reduce the volume of gas (putting the piston down 1-9 of an inch) 1-273 in volume—will raise any gas or vapor through one degree of heat. But the increase of pressure required, while uniform for

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every gas or vapor, is not a plain constant increase for every successive degree, but an increase after the square.

Then the transmission of heat, in this experiment, is effected through a displacement of P. S. of void matter in plane layers.

That this is the case becomes evident when it is considered that the particles of the coolest gas are apart from one another, and every degree of heat drives them farther apart.

The gas particles, therefore, resemble heavenly bodies in space, and like them they must be surrounded by void matter. Again, the amount of heat required to raise hydrogen through one degree under a given pressure is not the same as is required to raise the same volume of Chlorine under equal pressure through one degree.

And because the lighter gas requires the square of the proportion between them (that is, more than the heavier gas), it would seem as if heat were an exemption to the rule governing other forces in being able to do more with the same amount of action on a larger amount of material than on a less quantity.

But because weight is the result of the force gravity working upon the Mass of a substance, and the Mass of any substance is the number of Primary Spheres held together in the constitution of that substance; therefore, the heavier gas holds more P. S. in organization than the same volume of a lighter gas.

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But the volume is made up of organized matter plus that amount of void matter which fills the interstices, and consequently, if the lighter gas volume holds less organized Atoms, it holds more void matter. And whatever we deem the real nature of heat to be, this inflow of void matter into the interstices of a substance expanding by heat gives the radical unit of heat. One P. S. changed in position from without the substance to within the substance.

The flow of void matter, from the body contracting by withdrawal of heat, to the body expanding by heat is a necessary result in a Universe that is full. Yet the mere change alone of a Primary Sphere of void matter from a position outside of a body to within a body cannot produce all the phenomena of heat.

Whenever we observe heat passing from one body or substance to another, we may also observe a resistance to the necessary expansion. And that resistance is as much a part of the nature of heat as is the expansion. If it were not, heat would be like gravity, producing equal results on equal masses. But what is that resistance?

In the experiment illustrated by Fig. A there are no gas particles added by the added heat.

Neither is it possible to crowd in more void matter, for the Cylinder is full of gas and void matter. Then the pressure must come from without the Cylinder; and the resistance to that pressure is evidently in the solidity of the cylinder, for nothing

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else hinders the gas particles to spread out indefinitely.

The interlocking of the particles of solid substances presents an obstacle or a resistance to expansion by heat or any other possible expansion.

The action of gravity tends to force solids, liquid and gases toward a common centre of gravity, and, therefore, gravity resists the expansion by heat, and because of that even a gas surrounded by void matter only can be made hotter or colder.

Why do the Primary Spheres expelled from a cooling body force their way into the interstices of another body to heat it?

There is apparently nothing to prevent the expelled P. S. to immediately take up their place on the outside of the body from which they have been forced, for in the act of driving out the Spheres of void matter there occurs an equivalent contraction of the organized substance, so that there is neither gain nor loss of universal space in the whole operation.

Yet there must be something that compels Primary Spheres to move on, some mechanical necessity that is the result of a fundamental universal requirement. This compulsion to move on and away cannot well be conceded to be an inherent quality of Primary Spheres, but rather it must be a necessary result of a universal movement from the Infinite to the Infinite.

And perhaps it is this mysterious link alone that

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can ever reconcile the contradictions that confront our reason.

If we may take it for granted that there is a material movement from some great body, that is now changing from organized matter to void matter, to some other great body that is now changing void matter into its own organization, then we may conceive a compulsion of void matter to move from one to the other, and never backwards. And every living identity encountered by this stream must then be affected by it.

In the action of the Radiometer is indicated a constant stream of material particles, flowing from the cooling and contracting substance to the substance that is being heated. And the Radiometer keeps on turning in one direction like a similar wind engine. There is then no indication of a back and forth vibration such as would be expected from popular heat waves. Neither can it be denied that there must be a flow of ether from the cooling body and an influx into the expanding body. Yet there may be, even in an everflowing Stream, periodical changes of velocity, thereby making the action of the stream uneven and wave-like.

The heat coming to us from the Sun can come only as a result of a pressure on the whole aggregation of Primary Spheres between us and the sun. And the same pressure on the same intervening material is all that can bring light or anything else to us from the Sun. For the intervening void

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matter can suffer no change except a change of position of the individual Spheres.

Wherein then does heat differ from light or from any other manifestation of force?

All are at last the result of the one universal force causing a displacement of material parts. And, moreover, all are based upon and relative to that general movement of void matter in the process of universal life.

Always a manifestation of force is between two bodies; always one gives and the other receives. And the body that gives must exert a pressure, and the body that receives must within it have something that yields. Therefore, heat cannot go two ways, or in opposite directions at once, and our body cannot give heat to the stove while the stove is transmitting heat to us.

And while magnetism directly causes a contraction of the steel that is magnetized, yet there seems to be no available data to disprove a supposition that heat is evolved in the process.

Chemical action brings the particles of substances closer together, and always there is heat accompanying or caused by the process. Electricity and light produce heat in the substances acted upon most generally. But they evidently also cause other changes which are their distinct ear-marks.

But the expansion of substances by an inflow of void matter, under the pressure exerted upon the void matter by a cooling body that is contracting, this seems to be the real essence of heat.

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And the expansion is always against the action of gravity, and to some extent against the resistance offered by the interlocking of solid substances. Yet the most solid substance can interlock only as far as some result of the process of life holds so many Primary Spheres together in such a peculiar form.

But why does it take a greater amount of heat to produce, in the Cylinder of Fig. A, a given pressure through a volume of Hydrogen than through an equal volume of Chlorine?

It is not that the atoms of either of the gases are expanded or altered, and both are held in the same Cylinder, which is equally hot in both cases. And the atoms of each gas are apart from one another and surrounded by exactly similar Primary Spheres of void matter.

Evidently the greater mass of the chlorine offers a greater resistance, and it can do this only when there is in both gases a continual change. The lighter gas atoms must needs be smaller than the atoms of the heavier gas.

Therefore, the atoms of Hydrogen are farther removed from one another, and their influence, which alone can make the pressure observed, is exerted at a greater distance; and evidently in plane layers the Spheres of void matter participate in the diffusion of that pressure.

If heat were a vibration only, then we would have in the increase after the square, of the pres-

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sure exerted by heated gases in the experiments of Fig. A, a total contradiction of the observed laws of bodies in motion. For the relative energy or force required to move bodies is strictly in the simple relation of their Mass.

The arrangement of particles, of higher degrees than the first, undoubtedly makes the great difference in solid bodies under a manifestation of heat. There is nothing to indicate that the particles of solids are grouped in any certain invariable order, in plane layers or other arrangement. The melting points of alloys are most always different from a mean of their several melting points; sometimes lower than the lowest in the compound.

But because liquids have a great freedom of movement in the physical interchange of particles, while yet all liquids exhibit more or less cohesion, it seems certain that particles of liquids are arranged in plane layers, wherein they touch one another.

And because there is yet a great radical expansion in changing liquids to gases and vapors, the latter two must be apart even in the layers.

From wind and wave, from wireless telegraphy and many other indications it seems altogether probable that the layers of liquids and gases are normally arranged at right angles to a line drawn from them to the centre of the earth.

Where there is a great mass held together by gravity and interlocking, like our earth as a whole,

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the renewal of atoms at the centre must be, comparatively, very slow. This would hold true even if the vibration theory of heat were true.

There can hardly be any further contraction of particles at the centre of a great Mass.

What then is the temperature of this innermost part of a great mass? In order for this question to be decided it must first be decided what heat is. If it is an occult identity, an identity now residing in one mass of substance and now in another, stored up for ages in this material or that, of its own inherent potency, producing waves of invariable length and frequency, then such an occult power may be imagined to reside one place as well as another. And under this theory of heat the centre of the earth is deemed to be intensely hot.

But if heat is an abstract identity, a human conception of a certain class of changes in material only, then nowhere can heat reside as an identity in its own right.

Only as change do we know heat, and the intensity of its manifestation is dependent on the degree of difference in the two bodies between whom it is manifested, and on the rapidity with which they may undergo changes in cellular construction.

There cannot be any latent heat, or latent force of any kind; force cannot be asleep or employed elsewhere; an eternal change only can produce universal motion. And without movement there

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cannot be a manifestation of force. (Prop. VI, B. 3.)

Therefore, this manifestation of force known to us as heat, and whose main feature is a movement of ether particles from a cooling body into the interstices of a body being heated, this cannot be going on at the centre of the earth; therefore, the centre of the earth is devoid of any movement of particles caused by heat; the temperature is absolute zero.

If a shaft could be constructed from the outermost confines of the Atmosphere to the Centre of the earth and the rarified air brought as it is, to the centre of the earth, then there would undoubtedly be a great display of heat. Always a manifestation of heat requires an inequality; when two things are equally hot there will then be no manifestation of heat between them. So if it can be proven that all things on earth are getting to be more and more equalized in temperature, then heat is getting less on earth, *for heat is the manifestation of heat.*

Yet inequality of density is not necessarily inequality of temperature between relative substances, and this is very hard to reconcile with the theory that heat is the result of a universal tension equalizing a difference in density. But a hundred-fold harder it is to reconcile this with the accepted vibration theory of heat.

A thread of glass may be drawn out so fine that a naked eye may scarcely perceive it. And yet it

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will preserve its identity for a long time, subject to changes of temperature and light and electricity and cohesive strain, sound vibration and magnetic penetration and numerous other vibrations perhaps all at the same time. Still, in the vibration theory, nothing holds the particles of glass together in this mere line of a thread than just a set of vibrations among a thousand. Shall it be said that our dull ears can hear a sweet clear note among a thousand noises? Then shall a thousand ears distinguish the same note, and if perhaps it be a dinner bell, a thousand stomachs shall recognize the call?

So these same Ions that are outside of the mere line of the Glass thread, alike to them that compose the glass, why shall not they be affected in the same synchrony?

There is without doubt a very radical difference in the arrangements of the particles of solids and of the same substance in a gaseous state. No synchronic vibration in the molecules of gases makes a difference in the confined gases or vapors in the cylinder of Fig. A.

All gases and all vapors and all mixtures of them act the same. And density only determines the degree of heat. That heat exerts a pressure, this argues that there is a tendency of heat to pass from one thing to another. That such tendency is counteracted by gravity and hindered by the interlocking of particles in solids is proven in the constitution of the earth.

In every-day experience we know that it takes

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time to heat anything. Our water must circulate and be heated particle by particle; our Stovelifter stays cool on one end for a long time while the other end is already hot. Therefore, we know all bodies must be affected by heat one particle after another. And while they are thus affected by heat, they are at the same time affected by other forces. The centre of the earth, unaffected by changes of heat, is also unaffected by centrifugal force.

But in ever widening circle centrifugal force increases in intensity; the centre does not move at all (relatively), and the circumference more than a thousand miles an hour. And such increase is in plain relation to distance.

Gravity, on the other hand, diminishes in ever widening circle from the centre of the earth; yet such decrease is not in plain relation to distance, but after the inverse square. Therefore, momentum is more directly connected with universal force (the alternate current) than gravity is. And the utmost rim of the earth can be little or not at all changed by heat; it may be deemed an absolute Zero. It is between the Zero of the centre and the Zero of the circumference of the earth that manifestations of heat are displayed, and more particularly at the junction of the solid earth and the gaseous Atmosphere.

As far as any influence or radiation or transference of heat from one heavenly body to another is concerned there can only be one change take place between them; that is a change in the veloc-

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ity of an ever-flowing current, ever going and coming from one to the other in alternate layers.

And in reality this is all that heat can be between bodies anywhere. In a great river there may be many obstructions. And each one will do its quota to check the velocity of the stream. And each one will modify and influence the action of the current on the others, so that the swirling waters may even run upstream. And so do gravity and momentum and heat and all other forces change an ever-flowing universal current that is yet the superior, the moving and creating cause of all these manifestations.

PROPOSITION XVIII.

Magnetism is the result of the quickening of the stream of Primary Spheres, necessary for the renewal of Atom, on one end of a substance; and a corresponding retarding of that Stream on the other end of the same body.

Magnetism is that peculiar property possessed by a few substances which enables them to attract some other substance. And it is a common practice to call any manifestation of attraction magnetism. And attraction is a tendency to come together when the compelling pressure is not perceived.

If the magnetism about which we desire in-

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formation is an inherent quality of any substance, or of the atoms composing a substance, there is then no hope of ever learning the real nature of magnetism.

And if the power of the magnet to attract can be exerted on another substance without there being any intervening material to take part in the attraction, then that power to attract is an occult power, without the circle of human reasoning.

But magnetism may be induced in steel that shows no previous magnetism, and with the help of substances that are not themselves magnetic; therefore, magnetism is not an inherent quality of substances, but an acquired condition. And because the power of any magnet to attract is diminished after the square, by the increase of distance between the magnet and the substance upon which it acts, therefore, magnetism is transmitted through void matter in plane layers. (Prop. XII, B. 3.)

Magnetism is closely related to Gravity and many laws are common to both. Yet magnetism does not show a strict relation to mass; a magnet weighing a pound may be weak or comparatively strong, but it seems as if it were impossible to make a magnet capable of lifting more than the weight of all the material taking part in the action of the magnet.

Then because magnetism is not manifested in strict relation to Mass, it is evident that it is not a quality, condition or engagement involving the

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organization of the first degree only. For anything that pertains to an atom as an atom, making part of its form or life or constitution, must pertain to the atom through any and every higher degree of organization that the atom may enter into with others. Therefore, because magnetism, unlike gravity and Inertia, takes part in changes that a magnetic substance undergoes as a substance, it is something that pertains to degrees of organization higher than the first degree. And neither form nor constitutional requirements of atoms are changed by magnetism.

What then is the change a bar of steel undergoes when it becomes magnetic?

The only outward change is a contraction of the bar. But cooling also causes a contraction, without causing magnetism, and heat will destroy the magnetism of the bar in expanding it.

While the addition of magnetic quality to the Steel bar does not increase the Mass, as is proven by weight (Axiom 4), the centre of gravity of the bar is changed. And moving the bar toward either pole of the earth will again change the Centre of gravity of the bar.

Evidently, then, while the atoms of the Steel are ever affected, and affected alike, by the general universal current acting upon them as organized forms in the changes of the process of life, there is a further effect of the same universal stream, complicated through the organizations of a higher degree than are the atoms.

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Even as a man may be affected as a citizen of a State while his own affairs do not affect the State; and yet he is a citizen only because he is a man, and after all the whole State is based on his manhood.

Every higher degree of organization is based upon a preceding degree, and the form and constitution, and that which constitutes, an identity of a low degree, cannot be annulled or done away with in the organization of a higher degree.

The identity of the man is still in the State. The form of the atom of gold is still in the double eagle. And in the substance magnetized there are still the atoms unimpaired in form or constitutional requirements.

Every manifestation of force is a mechanical displacement of material parts. (Prop. XXI, B. 2.)

Magnetism is a displacement of void matter in plane layers. (Prop. XII, B. 3.)

The magnetizing of substances is essentially a mechanical process, whether accomplished through the strokes or contact of a permanent magnet, or through the subtle influence of an electrified spiral.

And it is evident that there occurs, in the substance magnetized, a rearrangement of particles relative to one another.

Magnetism is induced in the steel by tension, or by blows upon the end of a steel bar, held in a particular position relative to the earth's centre and magnetic meridian.

And from most, or perhaps all, phenomena per-

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taining to magnetism, it appears that the change which a substance undergoes in acquiring magnetism is a rearrangement of the organizations of the third degree within the substance. And after this rearrangement the currents of void matter, which are always necessary in the fundamental life of the substance and pertaining to the atoms, are switched into an altered course, or modified in velocity as to one part of the magnetized substance and another part or end of the substance.

For a perfect sphere or ring of steel may not be made into a permanent magnet; there is no magnetism without polarity.

And this polarity, which furnishes the most useful employment for magnetism, is at the same time inexplicable under any material Hypothesis, unless there is some sort of a current of void matter flowing, in an established direction relative to the earth, which engages the magnet.

That the magnet is thus engaged by a stream of void matter is indicated by the action of the magnetic needle in ranging itself parallel to an electric current, whatever direction that current may flow in.

And it seems that a compass within a Glass jar, from which all the air has been exhausted, ought to be influenced by heat passing through the vacuum from a source of heat to a recipient of heat.

And as well as the magnet must be influenced by any and every stream of void matter, so must any and every substance be influenced by such a

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stream. But because of difference of form of the different atoms, and of the difference of their relative position in higher degrees of organization, every substance must act different from another substance under the influence of any force. And the difference between them must result from dissimilarity, while many relations may be common to both.

It is then probably necessary to have a knowledge of the form of atoms, and of the form and positions of the combinations of Atoms of a magnetic or diamagnetic substance, in order to really understand magnetic action or the reason why the common steel becomes a permanent magnet by a few strokes of another magnet.

That such a knowledge, of the outward shape and every peculiarity of any given atom, is attainable through patient study, coupled with scientific experimenting and the help of mathematics applied according to the mathematics of nature, is evident when every occult conception and prejudice is thrown away.

For a sphere is a sphere whether it be as great as the sun or as little as the uncombined Primary Sphere of void matter. And all laws that pertain to the great sphere as a sphere pertain to the little one. And four spheres in closest contact produce a form that is perfectly similar whether the form be made of spheres a mile in diameter or the millionth part of an inch.

Undoubtedly five Spheres in closest contact con-

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stitute the lightest Atom (Prop. VI, B. 2); perhaps this is Hydrogen.

The least difference between any two atoms, according to some table of atomic weights, is 18-100 of the weight of the Hydrogen atom, between N S and C O. That seems to indicate the atom of Hydrogen is composed of five Primary Spheres or of a multiple of five.

By putting together, in closest contact, a given number of Spheres, there will always result a peculiar form. And that peculiar form will easily fit another peculiar form, giving an idea of the valence of chemical substances. The periodical law of Chemistry will furnish another guide, and most probable there will appear, in the increase of the constituent ultimate particles of Atoms, a fixed series, as there is in the increase of squares and cubes, and in circles that are in closest contact within a greater circle.

There are in the iron family, which constitutes the most prominent magnetic substances, many peculiarities. In order to make the magnetic quality permanent there seems to be required some sort of crystallization. The atom of coal somehow enters into combination with the atom of iron in steel.

And the mysterious process of tempering aids greatly in making the steel retain magnetism. Because iron and coal are very hard to melt it is evident that their atoms are very long in proportion to breadth.

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Because the atom of iron interlocks strongly it is evident that the atom of iron has very marked pertuberances, and most likely the atom of coal lies crossways of the iron atom in steel. And the melting point of steel is much lower than the melting point of iron, because it does not take near so much expansion to disengage the knobs.

The combination of the three magnetic substances, Iron and carbon in steel, with nickel in nickel steel, shows remarkable tenacity and very little expansion under given degrees of heat. Again, Iron and Carbon can be welded, either combined or each by itself. Iron and carbon constitute the major portion of meteors, and carbon seems to enter into most of the drugs that greatly affect the brain.

Evidently then there is in the form of these atoms some peculiarity which makes them different from other atoms.

No atom can be penetrated by Primary Spheres because the Spheres constituting every atom are Primary Spheres in closest contact.

Therefore, any stream of void matter, flowing in any possible direction, with any velocity whatever, must affect any and every substance alike; as is the case in inertia, and in strict relation to mass; unless there is within the atom itself and from thence to further combinations of several atoms a capability to engage that stream in a variety of ways. Because Gravity affects atoms as atoms in strict relation to Mass, therefore, the necessary

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change an atom undergoes to produce a tendency to come together (Prop. XV, B. 3) under the action of a stream of void matter, this change is common to all organized atoms. But the change a bar of steel undergoes is not common to all matter, not even to soft iron. Under any and all circumstances the changes that produce gravity are going on. But a like mechanical displacement of void matter produces magnetism also, and heat and light and electricity.

Then in that ever flowing stream producing gravity, can there be currents and countercurrents?

No material can go in two different ways at the same time. (Prop. V, B. 3). Therefore, since gravity is constant, the stream of void Matter producing gravity must also be constant.

Yet in the swiftest river there are eddies and whirlpools, produced by the very action of the current on obstructions. And so it seems that gravity may be superseded by a stronger force, while yet gravity furnishes the base for the superior force.

The magnet hanging on a spring scale in holding up a piece of iron does not gain or lose weight of its own while attracting the iron against the prompting of gravity; and while the iron is attracted by the magnet, it yet adds its own weight to that of the magnet in pulling on the scale.

Both Gravity and magnetism penetrate every known substance, or work through a vacuum.

It is then evident that both are a displacement

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of void matter. And when both work simultaneously on the same substance, through the agency of the same material, then that material must either go two ways at once, or that material must engage the same substance in different ways.

Let it be granted that there is a continuous flow of void matter toward the centre of the earth.

Let that current have a uniform, normal velocity of ten feet a second. Let it be granted that a horseshoe magnet hanging on a nail modifies the normal stream, through some peculiarity of internal construction, so that in one end or leg of the magnet the stream of void matter has a velocity of 12 feet a second, while in the other end or leg of the magnet that stream has a velocity of 8 feet a second. Then the middle will be normal or neutral, and the amount of material passing through the magnet will be the same as if the whole magnet were engaged by a stream of normal velocity, and consequently there would be neither gain nor loss of weight to the whole magnet.

Then if a bar of iron is placed close to the poles of the magnet, the Primary Spheres flowing at the rate of 8 feet a second will be unable to fill all the space vacated by the P. S. flowing through the normal bar of iron at the rate of 10 feet a second. Consequently there will be a pressure from the under side. But the P. S. flowing through the other leg of the magnet at the rate of 12 feet a second will cause an accumulation between that pole of the magnet and the bar of iron which

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absorbs the P. S. at the rate of 10 feet a second. Therefore, since both poles attract the iron, it is plain that the iron bar modifies or alters the normal flow also. If it were not so, every substance would be attracted by one pole of the magnet and repelled by the other pole. But let it be granted that the iron bar, because of the peculiar form of its Atoms, has a capability to shear the flow of P. S. from that end where they flow swiftly, to the other end where the flow is slower than normal, then the whole bar will be attracted.

And it seems as if the observed actions of the magnet can be explained under this Hypothesis, namely, that magnetism is the result of an acceleration of the flow of void matter on one side and a retarding of that flow on the other side.

Taking for granted that the alternate Hypothesis of the manner of an ever-flowing stream of void matter, from the infinite to the infinite, is true, then the velocity of such an alternate stream may be checked or altered even as if it were going in one direction only. If the alternate character of a universal stream consisted in a periodical renewal of direction, like in a certain class of Dynamo, then it would still be a solid displacement rather than a vibratory wave motion.

Since even gases are susceptible to magnetic action, the Atoms, or at least the second degree of organization, must be able to produce or respond to magnetism. Steel is not a carbonate of iron,

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and the tempering of steel is not a chemical Process. In the tempered steel the iron is still iron and the carbon is still carbon.

The sudden cooling contracts the steel, this is certain. The sudden cooling hardens the steel, that also is certain. And in sudden cooling the fibres of the steel become crystalline. Equally certain it seems that in the tempered steel the atoms, molecules or crystals cannot turn clear around or change end for end. Then while the magnetizing of steel does not in the least affect the temper, it yet causes a further contraction in the steel.

And since the whole process of magnetizing may be done by mechanical means alone, therefore, the particles of the steel undergo a change of relative position only in the process of magnetizing. A permanent magnet is generally composed of steel, carbon and iron. And carbon and iron generally compose the most part of magnetic ores or meteors or Loadstones. Because of their high melting points and great cohesion it is most probable that both the atoms of carbon and iron are particularly long in proportion to their breadth.

While a form built up of indivisible spheres cannot be a true sphere or rectilineal solid (Prop. X, B. 1), yet it may approach the general outline of such solid bodies. From various indications it would appear that the atom of carbon resembles an elongated cylinder in general outline, while the atom of iron resembles a triangular Pyramid.

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Let it be granted that this approximation is correct. Then the atom of iron by itself alone will retard the action of a disrupting current more at its base than at the point, and there will be a difference in the velocity of the current at the point and at the base. And the magnetizing, by bringing the points of two or more pyramidal atoms together, or by the joining together of eight pyramids in one new enlarged pyramid, will increase the abnormality of the alternate current between point and base. Then while carbon by itself does not show either magnetic or diamagnetic property to any great degree, its atoms probably serve either in preventing the iron atoms from turning in a direction that would not induce magnetic abnormality, or else they more probably serve to interlock the iron particles in the position favorable to magnetism.

That there are other atoms or molecules beside carbon that can make the peculiar position of magnetized iron particles permanent, this is quite probable.

And from the same consideration diamagnetism of substances must be a direct result of the abnormality of a magnetic current encountering the peculiarity of the physical shape of diamagnetic atoms.

Let it be granted that an ever-flowing alternate current travels in a direction of the terrestrial north and south. Then such current encountering a compass needle, through one end of which the

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current would pass quicker both going and coming, would not leave that needle at right angles to that current.

PROPOSITION XIX.

The dual nature of electricity is not a result of two different occult powers.

Electricity, while a manifestation of the one universal force, is yet a distinctly separate, identical manifestation. Light, heat, magnetism and visible mechanical motion can each be made to produce electricity, and electricity can be made to produce each of these in turn.

Gravity alone has not been turned into electricity, neither can all the electricity of our age detract from or add one grain to the weight of any substance.

There is not, in any manifestation of electricity, a strict relation between the intensity of the perceptible force and the Mass exhibiting it, and, therefore, the whole Mass does not necessarily always participate in the Phenomena. And we cannot accurately measure the Mass of a substance by means of electricity alone. The units of electrical measurements are at last based upon gravity, upon the movement of Mass in time and distance.

Except in electrical attraction electricity is not recognized as being subject to the laws of increase after the square by reduction of distance, and,

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therefore, it is not a displacement of Primary Spheres of void matter in plane Layers.

The peculiar action first observed of electrified bodies was the attraction for other bodies that glass or rosin showed after being rubbed with some dry non-conductor of heat.

And because the glass, after excitation, will attract various substances and after that repel them to be attracted by the excited rosin, and because two glass rods electrically excited will repel each other, as will also two sticks of rosin, and the glass will attract the rosin, therefore, it is evident that there are two kinds of electricity.

And in all electrical phenomena there comes into play an element of plus and minus, a positive and a negative. That this positive and this negative are really two different kinds of electricity does not necessarily follow; for any plus anywhere is always the result of some minus somewhere else; there can be no unqualified plus anywhere without an act of creation.

Positive electricity will flow from a wire intensely electrified to a wire that is charged with positive electricity of low intensity.

Neither positive nor negative electricity is an inherent quality of any material, for both have to be generated by friction or chemical energy, or mechanical motion or heat, and between all of these there is a perfect equivalent of production, and result in changing one into the other. And, after all, electricity, as well as any other manifestation

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of force must come down to the universal unit of force, namely, one Primary Sphere changed from organization to void matter, and the corresponding change of one Sphere from void matter to organized matter.

Positive electricity will be generated in Glass and negative electricity in sealing wax with the same friction. Yet with either material both kinds are produced simultaneously. Only in the case of one the positive goes to the substance rubbed and the negative to the substance used for rubbing, and in the other the negative goes to the substance rubbed and the positive to the substance used for rubbing.

And this positive and this negative may be in a manner stored up in separate bodies, and, therefore, it lies near at hand to attribute to electricity a dual nature, to take for granted that electricity is an inherent attribute of the atoms of all matter, but is in ordinary satiated in the union of the two kinds, and that electrical excitation is the result of the separation of the two kinds, and electrical energy the result of the reunion of the two kinds. This is, in fact, the generally accepted theory of electricity, and under it electrical science has made wonderful progress and innumerable observations have been made. But there seems under this theory to be very little hope of further theoretical advance, because any inherent attribute of either matter or force is beyond the scope of human reasoning.

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In electrical attraction, which penetrates some substances and which at least partially works through a vacuum, there is evidence of a movement of void matter.

For if the air is considered as a medium to transmit the attraction between the electrified glass rod and the attracted pitch ball, then the air must be incorporated into the glass rod, which clearly is not the case.

Yet all the while that the Glass rod is attracting, it is subject to gravity—that is, the atoms composing glass rod and pitch ball offer just so much resistance to the stream of gravity, for if there were no resistance there would be no tendency to go along with the stream.

But between the Glass rod and pitch ball there is an inequality which produces a current of void matter from one to the other, carrying the pitch ball with it.

PROPOSITION XX.

HYPOTHESIS.

The origin and nature of Electricity is a quickening of the process of life in one body, and a corresponding equivalent retarding of that process in another body concerned in the manifestation.

Every manifestation of electricity concerns two bodies at once. (Prop. I, B. 3.)

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And these bodies must possess some inequality. (Prop. XVIII, B. 1.)

Electricity that is transmitted continuously from one body to another body must be transmitted through a continuous stream of material from the transmitting body to the receiving body. (Prop. XVII, B. 1.)

And evidently when the transmission is intermittent, the flow of matter must also be intermittent.

Because electricity does not increase or decrease the Mass of bodies that are concerned in any manifestation of electricity, therefore, it is evident that no organized material is abstracted from one body and added to the other. And mainly for this reason electricity is generally looked upon as an occult power, needing no material for transmission, an energy, a force that is a primary identity rather than a peculiar result of the one Primary Cause, working, through mechanical displacement, on peculiar living identities.

Electricity is claimed to be motion, vibration, life, primary Cause, expression of infinite mind, or anything else to fit a preconceived scheme.

And yet electricity is ever associated with material, even the electricity of the heavens requires the thunder clouds to be brought to our perception.

And that change which electricity performs on any material, it will invariably perform under like conditions on like material. The laws that govern electricity are invariable and constant, and every

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known law is known only through the material with which it is associated.

And in electricity, as well as in every other field of investigation, the divorce of matter and force in philosophy, has led to the grossest materialism, on one side, while on the other side imagination has ran riot. Electricity cannot be primary when it consists of two kinds. Electricity is not life, but the result of life. And the only expression of mind a sane human can understand is ever conveyed through material.

All advance in electrical science has been the direct result of observing the actions of electricity on material. And evidently any real advance in theoretical knowledge of electricity must come through a closer acquaintance with material forms, and the mechanical changes their particles undergo.

As a proposition for solution by logical reasoning, electricity offers the same opportunities and the same difficulties that heat and light and magnetism do.

For clearly electricity is transmitted. It can be transmitted through matter only. That matter must be taken on one side and deposited on the other side. Yet there is no perceptible increase or decrease of either Mass or bulk.

That both propositions are true is uncontrovertible, and equally true that they are, to all appearance, contradictory one of the other.

The water wheel may not drive the mill unless

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the water actually passes from above the dam to below the dam. And yet neither the pond above nor the brook below need necessarily contain less water or more, when the wheel is running, than when it is not running. For there is really more to the mill, and the Waterpower, than water wheel and mill pond and brook below; sun and moon and stars work to replenish one, and drain the other.

And so every manifestation or transmission of electricity is not confined to the two dissimilar bodies, between whom it is manifested to us as electricity; but on both ends electricity and every other manifestation of force is connected with the whole Universe. (Prop. VIII, B. 3.)

The question of the nature of electricity then resolves itself into the question, how does electricity differ from other forces? How can a stream of void matter encountering the atoms or particles of substances produce the different phenomena of electricity?

When electricity is generated or separated by friction, the mechanical work performed on the two rubbing surfaces must then be the direct cause of electricity. And the friction is possible only because of the inequalities of the surfaces, and these must engage each other. And always this friction will produce heat, and always a part of the surfaces will be torn loose; there is nothing, however hard, but will be worn by friction. Evidently, then, in all friction there is a breaking up of atoms as well as of organizations of higher

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degrees. But a broken atom must necessarily be dissolved into Primary Spheres of void Matter, and these must create a pressure in the interstices of the particles of bodies heated by friction.

But it is possible and even probable that another result of friction is a turning around of particles protruding. Because electrical excitation is far more easily brought about with some substances than with others, it is evident that the peculiar form of the particles of substances has very much to do with electricity. And whether these particles are atoms acting as atoms, or larger aggregations of atoms in further organization, in either case they must be dissimilar in form.

In every method of separating electricity there is a development of heat, and heat itself alone will produce electricity, through means of unequal conductors. And ever there is some inequality in the substances used in any process of developing electricity. It is evident then that while there is a change in the flow of void matter to and from the interstices of substances electrically excited, this flow is in some manner different from the steady increase of the magnitude of interstices in substances heated. For electricity neither enlarges the bulk of a substance nor decreases it. Neither is there an increase or decrease of the birth rate of atoms over their death rate, for there is no change in mass; birth rate and death rate are ever equal, unless there is a total disorganization.

Then any change in the flow of void matter to

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and from a substance electrically excited must change that flow equally on both sides. If the flow into the interstices is quickened the flow from the interstices must be quickened; and if the flow of void matter for the formation of new atoms is retarded the flow from dissolved atoms must be retarded.

And the distinctive difference between magnetism and electricity seems to be that in magnetism there is a polarity or dissimilarity between two ends of the same substances, while in electricity that dissimilarity is in two different substances relative to one another.

Because electricity has no direct relation to mass, and because a hollow pipe will conduct electricity as freely as a solid rod of equal diameter, therefore, it seems conclusive that the surfaces of bodies only participate in electrical phenomena. And, therefore, it is unlikely that the flow of void matter, into the interstices of bodies, has much to do with electricity directly.

The hypotheses most nearly agreeing with observed facts and logical conclusions seem to be that electricity is an abnormal flow of void matter to and from electrified substances; that in the case of positive electricity the flow is greater than normal, and in the case of negative electricity it is less than normal. And always the positive must be accompanied by the negative, for the bodies that manifest one state or the other are both connected with the whole Universe, and positive and negative

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finally resolve themselves, in every case, to the unit of all force, the space vacated by a Primary Sphere in changing from void to organized matter.

But electricity may be in a manner stored up; the glass rod will attract after the rubbing has ceased, and our storage battery will retain its charge for a long time. It is evident then that there is a change the atoms, or higher organizations of substances, undergo in electricity. And if electricity is the result of an abnormal flow of void matter, a storing up of that condition can consist only in making the cause of the abnormal flow permanent. That this is accomplished by some turning around of the atoms of a substance seems likely, even as it seems to be the case in a permanent magnet.

The charging of a storage battery does not change its cellular construction, nor its chemical composition, nor yet its bulk or mass.

It were preposterous to suppose that electricity could be drawn out of the storage battery, like wine out of a barrel, a little at a time, if that electricity had no connection with material. But if the particles of the storage battery are altered in their relative position by electricity, then they must be altered one after another, and in the withdrawal of electricity one particle after another must resume its normal position.

How a change of ends of atoms, on any alteration in position relative to one another or the whole mass or common centre, can necessitate a

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change in the duration of the life of atoms, seems to be an unanswerable question, without an adequate knowledge of the form of atoms.

The telegraph wire is not a dead thing at any time, for in it every particle is held to the other by life, whether we call that life cohesion or any other name. (Prop. XXV, B. 2.) When a telegraph message goes over the wire every part of the wire must undergo a change. (Prop. XI, B. 1.) And at the sender's end something must go into the wire and at the receiver's end something must come out of the wire. And this something does not consist in atoms of copper or iron, or any other kind of atom, nor yet of any occult power. In the wire every particle is interlocked. (Prop. VI, B. 1.) And because the message requires time for transmission, therefore, it is not a straight column of Primary Spheres of void matter which transmits the message. For a straight column of P. S. must act as one whole, instantaneously.

Then since the material flowing into the wire is evidently void matter, that matter must either go around the protruding parts of atoms in the wire, or else play a part in the renewal of the atoms in the process of life; and because insulation adds greatly to the efficiency of the wire, it is evident that the latter is the case.

The electricity contained in the wire is quickly exhausted; if a large storage battery were circuited in, the telegraph wire would not act. But the wire comprising the whole line would contain

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far more material than the storage battery. It is evident then that the change in the wire by the momentary charge of electricity is of a somewhat different character from the change effected in the storage battery by being charged. The broken ocean cable will return the charge of electricity after a measurable interval.

It seems evident then that the atoms of the wire undergo a change one by one—that is, the change of one compels the change of an adjacent one.

That this is not possible without a necessary change in the process of the life of atoms is very evident when the amount of electricity necessary for the sending of a message over the Atlantic is compared with the amount necessary to change one pound of copper from the solution to pure copper.

Let it be granted that electricity is a quickening of the process of life in one, and an equivalent retarding of the process in another Substance. (Hypothesis.) Then how are these two connected in the one phenomena! Why cannot one condition be produced without the other?

And this question must connect electricity with gravity, and suggests the further question. If gravity is caused by a constant stream of void matter acting on atoms in the process of life, why does not a quickening of that process enhance the power of gravity?

In the first place, we cannot assign to force any definite direction; only between living identities

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can we perceive or conceive a movement, or display of force. (Prop. IX, B. 3.)

And in opposition to gravity we must have the force of acquired momentum in celestial bodies, or they will all come together by the action of gravity.

And this centrifugal force, or acquired Momentum, is not an inherent force, but ever the result of a previous action. And a previous action requires a previous power, and an identity to exercise that power, so that in any direction of material creation, or abstract thought, we must invariably finally come to the infinite.

But a finite identity is finite in its life, and when that life is the result of a displacement of matter, the amount of matter must also be finite.

Then the flow of void matter from one living identity to another in the whole fundamental process of life can be normal only while the identities remain as they are. But no two identities remain as they are for any length of time, and not even the elements composing a substance remain unchanged in proportionate amount to the whole mass.

And where can we find a living identity that does not change in Mass? Are our scales perfect at all places, times and conditions?

But it is evident that if the Fraser River conveys a certain amount of water from the cañons to the gulf in a given time, any obstruction placed in the river to retard the flow must necessarily compel a

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quickenings of the flow somewhere else, and readily every obstructing stone may be seen to produce a stronger current.

And so, granting a stream of void matter to the earth from the moon and from the earth to the sun, or from the infinite to the earth and from the earth to the infinite, if this stream has a normal velocity, any retarding of that stream in one place must necessarily produce an acceleration in another place, and that place will be as near by as circumstances will permit.

Therefore, if positive electricity is a retarding of the normal flow of void matter it must necessarily be ever accompanied by negative electricity.

In the second place, gravity cannot produce a tendency of earth and sun, or any other two bodies separated by void matter, to come together, unless there is a continuous change in both bodies. For a mere pressure of void matter must be equal on all sides.

And somehow through the processes of life in two bodies that attract each other, there is produced an inequality between the pressure on the void matter in straight lines between the two bodies and the void matter outside of these lines.

But this inequality between two insignificant bodies cannot alter the whole Universe, nor any great universal current. Even as a snag in the great river cannot check or alter the velocity of the current. The glass rod that is excited with

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positive electricity, and the stick of sealing wax that is excited with negative electricity, do attract each other; more and over and above the attraction of gravitation for each other. That is to say, the inequality of pressure on the void matter in straight lines between the glass rod and sealing wax, and the pressure on the void matter not in these straight lines, produced by the process of life in the normal earth current, is by the electrical excitation intensified and increased.

But that abnormal increase cannot alter the whole current, and while the electricity alters the rapidity of the change in the process of life of the sealing wax and glass rod, it does not alter the normal change in the whole earth.

Then because gravity is a manifestation of force between an identical body and the whole material composing the earth, and because every manifestation of force requires yielding on one side as well as pressure on the other side, therefore if the attraction of gravity is to be increased in the glass rod there has to be an alteration in the life process of the whole mass of the earth also, or else some nearby identical body must undergo an equivalent change. Generally the earth is deemed to be a great reservoir of negative electricity; it is able to absorb or neutralize all the positive electricity we may generate. Still there has to be some proper ground connection. This does not in any way contradict a theory that electricity is an inequality of the rapidity of exchange in the life process of

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atoms between a positively excited substance and the earth in its general normality.

Nor yet are Hertzian waves or X rays contradictory of the theory advanced. For in this theory an electrified condition is intimately connected with displacement in void matter.

There is then nothing to hinder an assumption that an intense inequality may find an outlet directly through void matter.

But even in that case something must compel and something must yield, however far these two may be separated.

The alternate hypothesis of the movement of a universal current will not advance the study of electrical phenomena except that it may account for a life process of Atoms without decrease or increase of Mass. That electricity and magnetism are nearly related is very evident, yet they are far from being identical. Generally it is claimed that magnetism is a dead attraction, while electricity is a living power.

The continued breaking up and reinception of the magnetic condition in the running Dynamo produce the electricity. That a similar inequality cannot be produced by differentiating between rising bodies and falling bodies is by no means certain. Neither is it certain that a properly made Radiometer, with its wings consisting of iron on one side and copper on the other side, will not turn in a magnetic field. The fear of the ridiculousness of perpetual motion is as widespread as the

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half instinctive notion of human force creation. Yet all life and all force is perpetual motion under any theory that has ever been advanced. If we believe that force is passing from one thing to another in the closed ring of vibration, then we believe that vibration to be perpetual motion. If we believe in the steady displacement of an alternate current, from the infinite to the infinite, by the very act of destruction building all things anew, then we must concede to the infinite all causation, and to the alternate current perpetual motion. And somehow we have to get hold of force that is not our force when we want to do things. We have to interrupt wind or water in their steady flow; we have to put in our engine, between expansion and contraction, in order to get power. And this interrupting of an ever-flowing current or an everlasting vibration, this is all that any so-called force can do; all force is but a change.

Electrical attraction is never permanent—that is, the attracted body will not stay attracted; apparently it is repulsed as soon as there has been a physical contact. Iron, the most pronounced magnetic substance, is not at all prominent in showing electric attraction. Yet iron is most readily and strongly magnetized by electricity. Steel magnetized by electricity is just as permanently magnetized as if it were done by magnetic induction. There is no difference in any respect between magnets made from other magnets or from electricity. Then since the same electric currents make such

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difference on iron and hydrocarbons, while yet they are composed of strictly similar Primary Spheres, that difference can only result from the difference in form of iron and hydrocarbons. Iron and carbon make a permanent magnet. Iron alone does not. Hydrogen and carbon are directly attracted by an electric current. Iron is not in any great degree. In either steel or Hydrocarbon the same carbon is a constituent. Then the difference lies most probably between iron and hydrogen. Again, most probably Hydrogen consists of five Primary Spheres and they can hardly be in closest contact in more than one way to be at all symmetrical. (Ocular Demonstration.) This reasoning would seem to indicate that magnetism holds the points of long triangular Atoms together, while electricity turns points outward.

A compass needle will range itself parallel to an electric current, always in relation to their polarity; then it is evident that whatever makes the needle point in a certain direction, that is also supplied by an electric current.

Then if the electric current make a different result on hydrocarbons from what the normal universal current does, it must either be different in its intrinsic nature or else it must differ in intensity or direction or velocity. But it will work in any direction. And it is not different naturally, for both the normal current and an electric current produce the same pointing in the same compass. It must be then that electricity is different in veloc-

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ity from the normal alternate current, and since it is ever positive and negative, it must be slower than normal in one substance and faster than normal in the other.

In conducting electricity a copper wire acts different than in conducting heat.

Heat engages the whole mass of the copper to a far greater degree than electricity does. Yet if the wire is too small to carry the electricity, heat will be generated. So it evidently takes material to convey electricity, and electrical resistance must consist in the mechanical obstruction the particles of a substance may present to an abnormal current, while yet they exist as organizations only because of a normal current.

Wireless telegraphy does not contradict this reasoning, and the mystery of its transmissions is more capable of solution under a theory of steady displacement than under vibration or occult theories. In thermo electricity there is unequal conduction; in the galvanic battery there are ever two bodies that are affected different by the acids. Can these unequal substances tear apart two distinct powers that are locked up in the embrace of each other?

In differentiating positive and negative, the bodies must themselves undergo a change. And this change must be prompted by a power that is already existing. And however many transferrences and changes there may be traced or imagined, at last it must come to the infinite.

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Then because the changes wrought in matter by electricity are not a displacement of ponderable matter or cause an increase or decrease of mass, therefore, electricity is in the last instance a displacement of void matter. And because electricity does not create force, there must be a displacement of void matter pre-existing to any manifestation of electricity. This displacement must now be ever present and must in some manner be alternate or there would be a general accumulation of mass. Upon this displacement of void matter different substances may take hold differently because of their form, which constitutes their identity. Then because finite substances cannot stop an infinite current while yet they engage that current, therefore, they can only modify its velocity.

PROPOSITION XXI.

The transmission of light is effected through a displacement of Primary Spheres of void matter, which cannot loosely vibrate.

Of all forces light seems to have the least relation to the mass of substances. In no known way can light be determined in amount or intensity by the weight or bulk of the substance which produces it, or upon which it acts. There is, therefore, no scientific unit of light, and the arbitrary candlepower is the adopted standard. But sunlight and artificial light are accompanied and, ac-

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according to generally accepted theories, they are produced by heat.

Yet Phosphorescence and the light of many animals as well as the North Light are not accompanied or caused by heat that is ordinarily perceptible. And many laws that are applicable to light are not common to heat or any other force, therefore, light is a distinct identical manifestation of the One Universal Force.

Because light does not add weight to a substance that receives light, therefore, it is not a movement of organized material. But light is a manifestation of force, and always there are two bodies concerned in the manifestation at the same time. And because the intensity of light is diminished after the square by the increase of distance between the bodies giving and receiving light, therefore, light is a displacement of void matter in plane layers. (Prop. XII, B. 3.)

Then whatever the origin of light may be, in the first place, and whatever the effect of light may be on the bodies receiving it, between the two bodies it is a mere displacement of Primary Spheres. And the Primary Spheres of void matter do not absorb light or reflect it; neither is there any refraction or polarization or any other change possible in void matter, except a change of position of individual spheres. Therefore, light can be light only where there is organized matter capable of undergoing change through the agency of light. And organized matter can undergo change only because

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of its organization; therefore, the organization or life of substances must give the key to unlock the secrets of light. While it has long been held impossible to make an engine that would move by light, this has lately been accomplished, and the appliance is somewhat similar to the well-known radiometer.

It does not need this new invention to prove that light is a mechanical displacement of material, for from every direction we receive light through intervening void matter, which can transmit force of any kind only through displacement.

And the generally accepted theory of light is a vibration of ether particles, of greater velocity than the vibrations of the same ether that cause heat. And the waves of light are said to move at right angles to the surface which they strike.

But this theory cannot be reconciled to the known laws of mechanics, for this broadside action really involves a movement of matter in every conceivable direction at once. Moreover, in a Universe that is full, without a vacant space anywhere large enough to hold one Primary Sphere, there can be no loose about vibration; the whole of all the void matter must move in unison. In a Universe that is full there can be no haphazard wave of ether or anything else, for the Primary Sphere or the brindled cat that moves must push something out of the way, and something will immediately fill the vacated space. As far as our conception of force goes, it is really a simple shove, and those things

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that do not participate in a movement can neither multiply nor divide a force.

Therefore, the intensity of light comes under the same law that the hydraulic jack, the lever, screw and pulley do—that is, when the same amount of force or crowding for space is distributed among many living identities or Primary Spheres, each one receives less than when the same amount is distributed among a few. And the movement of void matter throughout the Universe, as far as therein we may perceive living identities, however distant, becomes a problem that may be solved by human reasoning, when this movement is a displacement of Spheres in actual contact with one another.

It is the number of Primary Spheres that are in contact with the body giving out light on one side, and the number of P. S. in contact with the receiving body on the other side, which give up or take up space. And they involve in their own movement a greater or lesser number of columns of Primary Spheres intervening between the transmitting body and the receiving body. Then because these columns cannot be straight rows of Primary Spheres, one directly behind the other, but each one shoving two others, therefore, whatever the intensity of the force is on the ends, between them there are columns that increase in number after the square by increase of distance.

Then in the transmission of force through void matter there can only be one method, namely, the

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displacement of Primary Spheres in actual contact throughout the whole distance. And the force light is transmitted as displacement, and so is heat and magnetism and gravity. Yet none of these is alike, for the body that transmits and the body that receives are both capable of many changes.

Then light waves and heat waves are not different in intrinsic velocity, for the rapidity of the transmission depends on the yielding of the receiving body, just as much as on the pressure of the transmitting body. And the void matter affecting the illumination of a body does not that instant come from the source of light, for it was already in close proximity to the receiving body. Then is the transmission of light subject to the laws that govern the hydraulic jack, and laws that apply to spheres in full boxes are applicable to Primary Spheres in the transmission of light.

PROPOSITION XXII.

Incandescence is an abnormal hastening of the process of life, in the atoms composing the surface of the glowing body.

The white hot iron gives off light; the hot coal glows while the heat lasts, and the carbon of our glow lamp is not consumed. A stove may be red hot many times and yet lose little of its weight, and none because of the glowing.

It is then evident that the heat produces the light, and any loss of substance by the red hot

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body is only incidental, and not a necessary result of the incandescence.

Yet heat is not incandescence, and a degree of incandescence is not an absolute indication of a corresponding degree of heat, for all substances differ in capacity for incandescence. And while light and incandescence are in a manner words of like meaning, yet light is not always the result of heat. The light of the glow worm can hardly be considered as incandescence, the direct product of heat.

A red hot sheet of iron gives off as much heat and light as a cube of equally hot iron which has equal surface area. It is then apparent that in an incandescent body the surface only undergoes that peculiar change which produces light. That this peculiar change may be produced by means other than heat becomes evident when it is considered that heat is not an occult power, but a mechanical displacement. As a general rule, a solid substance is capable of incandescence in direct proportion to its ability to preserve the solid state under the influence of heat.

Because atoms as atoms can undergo no change except a change of position, which is common to any body, or aggregation of bodies in one organization; and the further change of life, existence and death; therefore, no amount of heat can make any single atom incandescent. And when any aggregation of atoms in the gaseous state are incapable of chemical combinations, then no amount of heat will

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make them incandescent. The illuminating gases of various sorts undergo some changes in the act of combustion, and these changes are both, organizing and disorganizing, at the same time.

Light is a movement of Primary Spheres of void matter, there can be no doubt of that. And equally certain a mere going back and forth of anything cannot produce force or transmit it either.

Then when the incandescent body produces light, the Primary Spheres that transmit that light must be thrown from the glowing surface. And all the while the glowing surface is emitting light, that surface, together with all the rest of the incandescent body, is under the influence of gravity and inertia and electricity and heat.

Therefore, every particle of the glowing substance is undergoing a change, while the surface alone undergoes that change which produces light.

The heat permeating the whole substance, enlarging its interstices, against the resistance of gravity and mechanical interlocking, is used up in the act of illumination—that is, the glowing body is trying to contract while some other body will not let him contract. Then is the incandescence the direct result of a flow of void matter from the interstices of a glowing body?

That cannot be the case, for then incandescence would have to cease when the melting point is reached, and every substance contracting by cooling would have to be incandescent. It seems rather as if the change in a surface that produces incan-

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descence were a hastening of the life process of outlying atoms. Those bodies that are hard to melt evidently possess atoms that are very long in proportion to their breadth, and probably they get broken up in the forcible expansion of heat.

While the light derived from incandescence does not increase the Mass of anything upon which it falls, yet every body absorbing light is increased in bulk; that is, the light heats up the body and enlarges its interstices, which must needs be full of void matter.

Then since the light of incandescence shows a surplus over normal, of void matter, and the transmission of light is a mere mechanical displacement of void matter, therefore, the abnormal flow must be produced in the incandescent surface.

But while that flow can be, in its abnormality, transmitted through a vacuum only by a displacement of P. S. of void matter, such transmission is greatly different from a transmission of any other force.

PROPOSITION XXIII.

(HYPOTHESIS.)

Transparency of solid bodies can only be a result of a change in the transparent body, effected through the agency of the light, on the life process of transparent bodies.

Gravity and magnetism penetrate all things.

Heat will distribute itself through the whole of any substance.

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But light penetrates some substances and not others, or rather, different substances permit the light to pass through in a different degree of perfection.

And the more freely a substance permits the passage of light, the less the substance is affected by the light.

There are few known solids which are perfectly transparent, or what is called perfect, but liquids are far more transparent than the same substance in a solid state, and nearly all gases are transparent. Again, many solids that do not seem to be transparent in the slightest degree, under ordinary conditions, will become to some degree transparent when they are worked down to a very thin sheet.

It seems then as if the property of transparency were a result of the cellular construction of a substance, the light penetrating between the particles more or less freely, according to the size of the interstices and their continuations in straight lines.

The particles of a gas are clear apart from one another, and therefore Primary Spheres, in the transmission of light, can pass freely between the gas atoms or particles.

Animal membrane, freed from fats and coarser tissue, oiled paper and various other things of like nature, while permitting the light to pass, do not permit us to see things on the other side of them. Yet a window of oiled paper will give light enough to read by.

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It seems, then, that a translucent body can permit the passage of Primary Spheres, in light transmission, only in a zig-zag course, while a body that is transparent allows the passage of Primary Spheres in continuous columns, everywhere one P. S. pushing two others, in a straight line between the transmitting body and the receiving body. Undoubtedly it is the prevailing opinion that light directly penetrates all transparent bodies, even solid, transparent bodies. And, it is said, that even in the most solid bodies at the lowest temperature the atoms are clear apart from one another. And each atom is surrounded by ether, and light is a very rapid vibration of that ether.

Let it be granted that this is the case. (Hypothesis.) Then, because under this Hypothesis the whole of all the ether is in uninterrupted contact there is no solid background anywhere.

And when a certain amount of ether moves in a given direction, all the ether must move with it, or at least all the ether in all the planes wherein the movement originated. And a ray of light must, under this Hypothesis, penetrate all things, and all things alike; there is no solid background anywhere. It is then evident that this Hypothesis cannot stand the requirements of individual reflection or transparency of bodies.

All force is Universal force and every movement is a Universal Movement; and yet every substance is an Identity, and every motion is an identi-

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cal motion. And this is a world-old mystery, and the solution, "the identical life of every living identity," is an equal mystery. Light cannot and does not penetrate a solid substance as a direct movement of Primary Spheres in plane layers, or in straight columns. For the particles of solids are interlocked in actual contact with one another. (Proposition VI, B. 1.) And the density of a substance has very little to do with its transparency, for the transparent glass is undoubtedly more dense than is the opaque piece of cardboard.

Again, the glass actually loses in transparency by being heated to a high degree, which undoubtedly enlarges the interstices between particles.

The pure carbon of the diamond is transparent, although its particles are a hundred-fold closer together than the spongy charcoal, and that peculiar arrangement of particles in crystallization is the very essence of the transparency of carbon.

There is, then, in the transparency of solids, an undeniable element of individuality, and individuality must needs be the result of a peculiar arrangement of primary particles, when these particles are in the last place, all alike and exactly similar.

Roentgens X-rays penetrate a vacuum. They are then a displacement of Spheres of void matter. And these X-rays are propagated or projected through solids which are not transparent. Yet, they cannot be more rapid than hypothetical light-waves. Heat that is projected through a rock-salt lense cannot be a more rapid vibration than light

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which cannot be projected through the rock salt.

Again, in the production of colors, both by reflection and through means of peculiar transparent bodies, there is an almost infinite individuality.

And, while the analyzation of the manifold changes wrought by light are probably too subtle for the complete understanding of any one, yet it is certain that these changes are not produced merely by a variation in rapidity of light-waves. For, in the transmission of force from one body to another body, every intervening body must undergo a change. (Proposition XI, B. 1.) And when we put a pane of glass between us and the Sun, that glass does certainly intervene, even as the atmosphere does. And atmosphere and glass are both changed, in a different degree, by the transmission of the light. But not in degree only does the change produced on the atmosphere differ from the change produced in glass, or in Iceland spar or mica.

For, in a solid, the interstices cannot continue in straight lines, and the change that a transparent solid undergoes in transmitted light is not a mere negative sifting through the holes, but must needs be connected with the life process of the transparent body. That the accumulated data of the actions of light can be resting on a wrong basis, seems almost incredible, and yet are the ether waves of the dynamic theories an utter impossibility.

Humans are ever ready to throw aside logical conclusions for popular appearance, and spectral

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analysis, polarization, color effects and many other observed effects of light make up a great sum total, strengthening the impression that light is a primary identity, yet capable of undergoing changes within its own nature. And yet light coming to us through millions of miles of void matter can only come as a mechanical displacement of the spheres of void matter. (Proposition XX, B. 3.) But the changes produced by that light are not only a result of such pressure of displacement, but in equal measure these changes are the result of living identities yielding to that pressure (Proposition III, B. 3.) And because the living identities differ from one another in essential form, as well as in outline, therefore the same mechanical pressure of light on the endless variety of living identities produces the innumerable effects of light.

And it is evident that a knowledge of the forms of atoms, and the resultant shape of the combination of different atoms in the molecules and higher combinations, of glass and other substances, would greatly aid in understanding transparency.

Light that would penetrate all things would not be light at all; we could not perceive it.

There is a radical difference between solids, liquids and gases, which is not a mere question of degree of nearness of one particle to another. (Proposition VI, B. 1.) And, in spite of modern theories, there is required something solid somewhere, some background for the action of force.

The light-waves are thrown out of their course

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in passing through aggregations of matter of different density. Evidently, then, the light does not merely pass through the holes, but the intervening matter undergoes a change because of the light. Then every identity undergoes a change, under the influence of light, that is different from the change that any other identity undergoes, therefore is light the first and foremost impression; therefore, we receive the sense of outline, of color, size and texture.

What, then, is the difference between transparent body and the body not transparent? Upon all of them alike the pressure of a given beam of light is exerted. And the change produced by light is on the surface only, of the reflecting body, and turns to heat in the interior of the opaque body, while the transparent body transmits the change, produced on the surface, to every subdivision of the body, and from the last particle again to an adjacent body that repeats the process or to void matter. The popular conception of light is, that the vibrations producing it are identical in frequency and extent. And in its own nature, that is, in the length and rapidity of the waves, it is already divided into the colors of the spectrum before it acts on any material body. And yet light is not and cannot be anything more than a mechanical displacement of void matter between one celestial body and another in space. And that void matter, whatever we may choose to call it, does not possess the power to acquire momentum. So one wave

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of ether cannot impart acquired force to a succeeding wave, for if that were possible, then an unrestricted movement of celestial bodies would be entirely impossible. Then the transparency of bodies must be closely related, and determined by the life process of the transparent bodies. And that life process can be different only because of difference in the form of atoms and their arrangements in higher degrees of organizations.

PROPOSITION XXIV.

(HYPOTHESIS.)

Light is the most direct displacement of Primary Spheres in void matter, transversing even moving layers in straight lines, while yet the movement of light enters into every other movement of void matter and into every change of organized identity.

The Mosaic conception of creation gives to light the first and foremost place in the organizing of the void and formless Universe. And while light is itself a creation, the result of the primary cause, it is invested with an identity, prior to any organized form and any other manifestation of force.

It has been argued that light cannot be conceived as pre-existing to the Suns and to other sources of light in the heavens, and yet light is held to be the result of some decomposition.

Then, while it is utterly impossible to conceive

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of light where there is no organized material, it is equally impossible to conceive that a sun can give out light by decomposing before it is itself organized. And an eternal sun or succession of suns is just as incomprehensible as an eternal identical Primary Cause.

We look upon sunlight as the primary cause of earth life. And everything living upon the earth is looked upon as directly or indirectly the result of sunlight. Therefore, naturally, light is looked upon as the King Force, as of greater importance than other manifestations of force.

But no manifestation of Force can in reality be greater than another manifestation of force. For, in the endless circle of cause and effect, every cause is an effect and every effect is a cause. We look upon sunlight, and upon our artificial light as the result of incandescence, and upon incandescence, as the result of the dismemberment of something that light has built up. And yet heat, the cause of incandescence, is itself the result of a movement of void matter from one body to another.

Is, then, light that which holds a substance together in its own identical form? Certainly not, for between two living identities in the manifestation of light, it is only a displacement. But the displacement caused by light is more direct between source and recipient than that which causes gravity. For in light transmission intensity is increased, after the square, by lessening of distance, and in gravity after the inverse square. And yet the pres-

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sure of light is into the whole universal aggregation of Primary Spheres of void matter, and must produce a tension on the whole universal space. Therein again is set forth the paradox of nature and of the life that animates nature.

Let it be granted that popular theories are correct. (Hypothesis.) Then the whole perceptible universe is in a constant state of vibration. All ether is in direct communication, all force must counterbalance itself, even as the air balances itself on one side of us and on the other. And the occult life of identities alone produces an inequality between them which produces manifestations of force, or as it is generally understood, it produces the several identical forces. (Hypothesis.) Yet, under this modern theory, this identical life is again but a product of universal vibration, and under the most advanced (?) theories the whole material Universe is a pipe dream, a mere imagination of some identity whose consciousness is of yesterday. (Hypothesis.)

But true science is sharply divided from any occultism, and any theory that bestows any occult inherent power on radium or any other material, however complex in its organization, has no proper place in pure Science. For science is based on reason only, and reason can only perceive changes in material forms.

And so light can be known only, and studied rationally only, as it produces changes in material. Then while any pressure of light, from incandes-

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cence or any other source, is into the whole aggregation of primary spheres, it is yet a direct movement of plane layers of Primary Spheres between the body giving light and the body receiving light. The light shines; it will not directly go around any ordinary screen; it may be concentrated with a lense, or deflected by a mirror.

And yet it is a steady displacement and not a succession of rebounding waves that transfer an occult power, a power that can ever be separate, for the least fraction of time, from material.

And these two propositions, equally true, that the pressure of light is into the aggregation of the whole, and that the movement of light is in direct lines between the body that gives out light and the body that receives light, these problems are presented in the hydraulic jack, in the lever screw and pulley and in all the mechanics of Nature.

Because there is little, if any, evidence that the sun or any other body the source of light, suffers any decrease in mass by giving out light, it is probably seldom that any total decomposition takes place in the phenomena of light. But rather, light is the result of a great hastening of the dismemberment and reorganization of Atoms on the surface of bodies giving out light. Light is intimately associated with heat and electricity; it is comparatively easy to convert any one of the three into both others, and yet there is a wide difference.

But all three, and every other force, are a change in material, and based upon that which produces

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the difference between tangible and intangible material. The acceleration of the outlying atoms in their life process must be far more intense than it is in heat or electricity, and when heat and electricity are intense enough they will always produce light. And in its intensity light will directly cause a movement in Primary Spheres that intervene between organized bodies; it will not require the presence of atoms to conduct it along. Light is then more particularly a movement of void matter. But whenever that movement encounters organized identities it must then enter into the life process of that identity, and modify and be modified by that process. The light cannot as light pass along the optic nerve, neither can it penetrate transparent bodies as an uninterrupted displacement of P. S. in plane layers. From this encounter with organized bodies must spring the wherefore of spectral analysis and all the different effects of light.

PROPOSITION XXV.

There is one universal material. There is one universal force, the displacement of material parts. There is One Identical, Primary, Incomprehensible and Everpresent Cause, of all Identity, of material Form or manifested Force.

There is something that is real, that is not the creation of our imagination. Conscious reason perceives space-filling material by perceiving innum-

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erable changes in material. And these changes are not haphazard, but in ordered sequence, one change is the inevitable result of a former change; they are perceptible to every sane mind, minds and imaginations that are widely different in many respects. The very sanity of the human mind demands even a plain recognition of physical facts.

Then, while every sane mind does perceive the reality of ponderable, tangible matter, it has also the power of invading the borderland of abstract thought. And this power of thinking of our thoughts, as Swedenborg has it, is plainly an attribute of conscious humanity.

Yet is the most abstract thought ever based upon Material. The sublimest music is lost on the dulled ear. The man deprived of sight cannot drink in the glory of form and color.

And if he was always blind, and now gain the power of vision, though his mind was sane always, he finds that his most intense imagining could not approach a visible reality.

An immortal Milton or Dante, singing of Identities and manifestations outside and beyond a material Universe, they do not take us and our imaginations out of a material Universe, but they reduce a spiritual beyond to material. It may be the height of high art, and perhaps that is the reason why common mortals can't read Dante and Milton, but what is that Beatrice that walks and talks? What is that Lucifer that fights and falls for three days? Like a ton of coal, he is amenable to laws of time

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and distance. All the wisdom of the Chaldeans, all the abstract thoughts of countless millions, are utterly lost to us except where they have been preserved in material records. In stone and iron, in the written page, in records impressed on material brains, reproduced from one brain to another by material impression, this is all we have of all the thoughts and emotions that preceded our own generation. Is not an Edison Amberole Record a greater wonder than a thousand spooks materializations, yet it is frankly material, while yet the most abstract thought may be preserved and transferred to generations yet unborn.

The idolatry of Force inherence will be ever co-existing with human ignorance. Where shall we worship, in Samaria or in Jerusalem?

Humans are ever more ready to trust their superficial impressions than their abstract logic. It is easier to observe a thousand occult powers in the image of stone than to prove the life process of that stone.

Das Ding an sich! How powerful the appeal. It seems so natural, so lazily convincing, this inherent identity of stick and stone and platonic human. And yet science must give up all force-inherence theories or be hampered and swallowed up by occultism.

Scientists of our day generally claim to scorn all occultism, while yet they hold heat to be latent in coal and muscular strength in the Athlete.

The very essence of dynamic theories is the trans-

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ference of force from one wave to another without transference of material. Let it be called by any name whatever, it is yet an occult force, and that is the reason why three-fourths of the literature of occultism is vibration. In acquired momentum there is held to have been created an occult propensity to move, in a straight line preferably, but else in any other line (demonstration, the pendulum), and any direct and constant relation with displacement in universal space is utterly ignored. And the doctrine of universal evolution, so generally accepted by scientists, is in its very essence occult and must lead to occultism. For the first ion or particle of chaotic matter, self created, or by itself ever existing as a particle of void or chaotic matter, evolution gives to this particle an occult longing for organization. The association of particles is held to be neither an accident nor the result of an influence outside of chaotic matter, but the result of an inherent longing for perfection, strengthened by every environment of further organization, until longing and striving awoke in the conscious I. Then logically this conscious I is greater than all material, and all environments. In its own sovereign right it has dominion over force and matter. It is not by mere chance that every fantastic creed should so eagerly seize upon the philosophy of evolution. For, in the progress of evolution, the physical, mechanical necessity is not the moving factor, but an incidental result, and back of every cataclysm in stellar space, back of

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every slow growth of development through changes in environment, there is, in the accepted theories of evolution, an inherent power of attraction, of occult selection, in the last instance, ever the product of an occult desire. And growth, from an infinite nothing at all, to an all-embracing infinite perfection, this is the essence of evolution. This also is the essence of the New Thought, as old as the idolatry of the evolution Cave dweller.

In opposition to this idolatry of occult force-inherence there has been, from time immemorial, a philosophy of Monoism, perhaps best expressed in the lofty Agnosticism of Moses: "I Am That I Am."

The eternal beginning, the endless end, this is beyond all human reason. Science has nothing to do with this. Pure science is the knowledge of the changes wrought in matter by force. And Art is the recording of abstract thought in material. Any true religion is a conscious relation of a conscious finite Identity to an Infinite Consciousness.

Certainly force is infinite and occult; it is ever beyond human reason until human reason itself be changed.

But any manifestation of the one infinite force is just as finite as any material. And the identity of any force manifestation does not consist in, or result from, any identity inherent in the manifestation, but only through material, organized forms can a universal displacement of void matter be varied into identical manifestations of force.

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We can not directly perceive such a universal displacement of void matter. We cannot comprehend its origin. We can scarcely determine its direction between nearby bodies in stellar space.

The alternate hypothesis concerning the manner of the flow of universal material may be decidedly wrong. But the displacement of void matter as the origin of every change in ponderable material, this will not be found wrong in the years to come.

And the identity of Forms, material and ever-changing, yet indestructible through constant reproduction, is a creation by an Infinite Cause, whether they were created identical forms, or a mechanical result of the addition of motion to a Universe.

And that Identity of Form, every identical Primary Sphere in its identical place, may not this be renewed after total destruction by the Infinite Power that first assembled the first similar Form?

And may not then the life of the Identity be no more the result of change, but change itself be no more!

THE END OF THE THIRD BOOK.

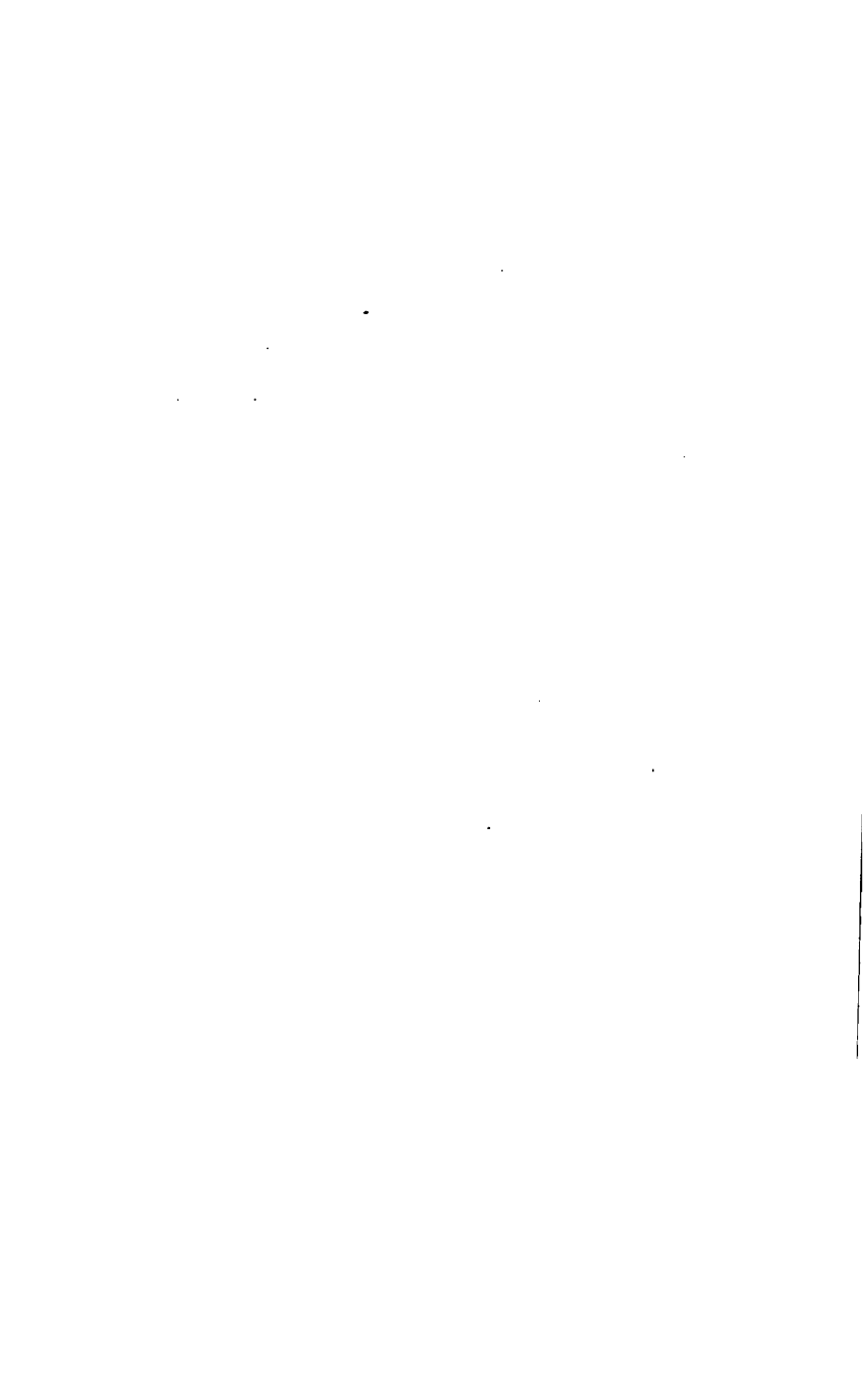
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